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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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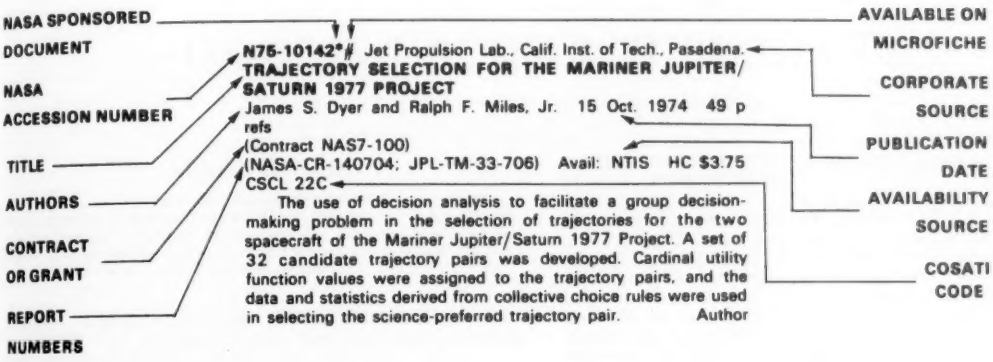
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James S. Dyer and Ralph F. Miles, Jr. 15 Oct. 1974 49 p refs
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(NASA-CR-140704; JPL-TM-33-706) Avail: NTIS HC $3.75
CSCL 22C
The use of decision analysis to facilitate a group decision-making problem in the selection of trajectories for the two spacecraft of the Mariner Jupiter/Saturn 1977 Project. A set of 32 candidate trajectory pairs was developed. Cardinal utility function values were assigned to the trajectory pairs, and the data and statistics derived from collective choice rules were used in selecting the science-preferred trajectory pair. Author

ON-GOING RESEARCH PROJECTS

This is a listing of research projects - not publications

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power; Aircraft Stability and Control; and Research And Support Facilities (air). For Related Information See Also Astronautics.

1.0001, GAS DYNAMICS BY MOLECULAR SIMULATION

G.A. BIRD, Univ. of Sydney, *Sydney, New South Wales, Australia* (AF-AFOSR-2336-72)

Air Force flight systems and gas laser systems involve gas dynamic flows in all density regimes from the free molecule flow to continuum flows. More complete knowledge of these flows is needed for design of the vehicles and flow devices involved, as well as in devising operating methods and procedures and in designing detection, identification, and surveillance methods for defense against hostile vehicles. This research exploits a specific numerical approach to gas dynamics, called the Direct Molecular Simulation Monte Carlo Method, for the solution of some practical gas dynamics problems which either have no other practical method of solution or which may have other less effective methods. Especially in low density flows, the past successes of the method introduced by this investigator have led to its widespread adoption by numerous laboratories. It now appears feasible and offers some attractive advantages to adapt the method still further for certain higher density flows which have heretofore been considered in the continuum range. The current year's effort will emphasize this aspect, attempting to take advantage of the availability and characteristics of new mini-computers with which long running times (hours or days) are economically feasible. In addition, the Direct Simulation Monte Carlo Method will be used to study the viscous boundary layer near the exit of a nozzle exhausting into a vacuum, and to study photophoretic and thermophoretic forces on suspended pollutant or cloud particles.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0002, RESEARCH ON WALL TURBULENCE 11170-E

R.F. BLACKWELDER, Univ. of Southern California, School of Engineering, *Los Angeles, California* 90007 (DA-ARO(D)-31-124-73-G118)

To investigate the phenomena of turbulent bursts which are known to occur near the wall in bounded turbulent shear flows. Relevance- the results of this investigation are important to the understanding of turbulent boundary layer development in both steady and unsteady flow, and therefore will contribute to research currently underway at EBL, Aberdeen Proving Grounds and the Army's helicopter and V/STOL aircraft designs, i.e., blade vortex shedding and stabilizer controls.

Information will be obtained on both the streamwise velocity and the normal velocity of the flow. Conditionally average the normal velocity component as well as the Reynolds stress during the burst occurrence and when there is no bursting activity, as well as decay of the burst.

Supporting agency address information: OCRD Research Office Durham, Box CM, Duke Station, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

1.0003, DYNAMICS OF VORTICES AND SHOCKWAVES IN NONUNIFORM MEDIA

H.W. LIEPMANN, Calif. Inst. of Technology, Graduate School, *Pasadena, California* 91109 (AF-AFOSR-2092-71)

Among the many important aerodynamic consequences of aircraft flight operations are shockwaves and vortex flows. This effort comprises investigations of these two topics. Shockwaves occur in nearly all transonic and supersonic flows, whether external to the aircraft, in wind tunnels, or in engines. The focussing of shockwaves by atmospheric irregularities and supersonic aircraft maneuvering patterns sometimes forms destructive superbooms. Experiments are progressing on shockwave focussing, using a shock tube and a spherical reflector, to determine quantitatively how nonlinear acoustic propagation effects limit the overpressure near the focal point. Also, acoustic spectral and spatial scattering of shockwave energy by propagation through a known turbulence structure is being measured. Vortices are prominent features of both the near flow field and the far wake generated by a body subject to lift or drag, and the full understanding of these forces requires full knowledge of the mechanics of vortices. The vortices in the wake of large aircraft cause the notorious aircraft wake turbulence hazard. Work is continuing in an effort to find the factors governing the flow patterns, turbulent transport, stability properties, and decay rates of trailing vortices.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0004, FUNDAMENTAL COMBUSTION STUDIES RELATED TO AIR BREATHING PROPULSION

F. WILLIAMS, Univ. of California, School of Engineering, *San Diego, California* 92038 (AF-AFOSR-2333-72)

Advanced subsonic and supersonic air-breathing and hybrid engines are required for future aerospace vehicle and missile propulsion for effective weapon delivery at supersonic and hypersonic speeds. This research on unresolved problems associated with ignition and combustion of premixed and nonpremixed turbulent subsonic and supersonic flames will aid in understanding the combustion mechanisms and dynamic processes involved and in engineering design, development, and control of practical combustors for these engines as well as of external burning systems. This program includes study of ignition and combustion processes of hydrocarbon fuel droplets and solid particles in oxygen/argon or oxygen/nitrogen atmospheres over a pressure range of 1/10 to 5 atoms and droplet diameters from 20 to 2000 microns and over the range of mole ratios for which combustion occurs. Ignition will be produced by a pulsed laser for the solid particles and by a spark source for the hydrocarbon droplets. High-speed photography will be used to observe ignition and combustion phenomena. The experimental observations will be used as guides for developing theoretical models of the burning processes. For the solid particles, the objective will be to describe both the basic ignition process and the steady-state combustion process, including the effect of heat release associated with condensation of product smoke. For the hydrocarbon droplets, emphasis will be on combustion dynamic aspects of overall finite-rate gas-phase chemistry and on extinction processes, as they affect smoke production and loss of combustion efficiency.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0005, EFFECTS OF BOUNDARY DISTORTIONS AND OTHER PERTURBATIONS OF KNOWN FLOWS
N.D. MALMUTH, Rockwell International Corp., *Thousand Oaks, California* 91360 (F44620-71-C-0021)

The AF will require improved aerospace vehicles in the future which will have superior operational capabilities to those of any potential enemy. To adequately support the next generation of tactical and strategic vehicles, continued analytical studies are required in transonic and supersonic aerodynamics. In the transonic regime fighter maneuverability and cruise efficiency must be improved. At high supersonic mach numbers, performance requirements necessitate large thrust to drag ratios. Thus the development of generalized analytical methods to minimize drag and the mutual interference between wings and fuselages at these speeds is very important. Current methods for the mach numbers near one and above about four have only limited applicability to particular configurations, usually those where only small disturbances and linear relations are considered. This investigation will continue theoretical work to treat problems in nonlinear transonic unsteady flows, interactions between shocks and boundary layers and between wings and fuselages, and three-dimensional, large parameter, hypersonic vehicle configurations.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0006, NONDERIVATIVE OPTIMIZATION IN ENGINEERING DESIGN AND ANALYSIS
R. MIFFLIN, Yale University, Graduate School, *New Haven, Connecticut* 06520 (AF-AFOSR-2695-74)

The concept of configuration optimization in aerospace vehicles, i.e., balancing aerodynamic considerations against other design demands to gain additional performance effectiveness for the vehicle as a total system, has led to significant improvements in the RDT & E of supersonic aircraft. Similar advances based on optimization have been made in the structures area (see for example AFFDL TR-73-6). These advances have largely been the result of such numerical methods as finite element techniques combined with the power of modern, high-speed digital computers. Now there is an evident trend toward increased use of certain mathematical programming techniques to obtain optimality in engineering design and analysis, however, the existing capability of these techniques is frequently inadequate for the larger, more complex (nonlinear) problems. This work unit will develop new and improved theoretical results and computational algorithms for solving nonlinear programming problems without using derivatives of the problem functions, thereby reducing the solution time required and bringing those optimization techniques into more general use. Specific topics include (1) stepsize choice, (2) search direction with nonpositive definite second derivative matrices, (3) quasi-Newton modifications, (4) bounds on variables, (5) generalized constraints, (6) extensions for nonconvex and/or nondifferentiable functions, and (7) computational efficiencies.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0007, A LIMITED-VORTEX-WAKE ANALYSIS OF HOVERING HELICOPTER ROTORS 11630-E
R.B. GRAY, Georgia Inst. of Technology, School of Engineering, *Atlanta, Georgia* 30332 (DA-ARO(D)-31-124-73-G184)

To predict helicopter rotor wake geometry in hovering flight. Information about the near free wake generated by the rotor blades of a hovering helicopter is of considerable interest to the Army. The influence of this wake directly affects the payload lifting capacity of the vehicle close to the ground at lift-off as well as the aerodynamic stability of the aircraft under gusting conditions near the ground.

This investigation will be directed toward an analytical and experimental study of a helicopter wake model using a helicopter rotating single blade. An initial wake geometry will be determined. This, in turn, will be truncated at various distances below the rotor and the effect on the computed geometry and strength distribution will be observed.

Supporting agency address information: AMC Army Research Office ARO-D, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

1.0008, ROLLING MOMENT AND SIDE WASH DUE TO SIDE SLIP FOR JET-FLAP-WING BODY COMBINATIONS
L. BARNETT, Lockheed Georgia Company, *Marietta, Georgia* 30060 (F33615-73-C-4142)

AF function - design of STOL aircraft, flight dynamical problems for yaw and sideslip. Deficiency - lack of methods to predict quickly the lateral directional aerodynamic characteristics for aircraft with jet flaps. Research - study of the applicability of simplifying concepts in particular that of a flat mechanical flap equivalent to a jet flap. Writing a computer program package for design purposes. How research contributes - quick and reliable prediction of important stability derivatives, in a form which can be used for design studies. The purpose of this effort is to develop a program for predicting the lateral directional characteristics of jet flapped wings in combination with a body. Of particular interest is the rolling moment due to side slip and due to the side wash derivative. Parameters to be considered are wing platform, sweep, momentum distribution across the span, body cross sectional shape and the location of the wing relative to the body. An essential feature will be the concept of a mechanical flap equivalent to a jet flap. The goal is to obtain a computer program which works rather quickly so that it can be used as a design tool, even if this entails minor sacrifices in accuracy. A comparison with test results and if available more accurate theoretical predictions will be carried out.

The method to be worked out here complements more ambitious and time consuming methods to predict the behavior of the aircraft. Simple approximations for the effect of the jet flap and for the airfoil lift distrubtion are used, and a program is assembled which can serve to make quick design predictions.

Supporting agency address information: Aerospace Research Laboratory LB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0009, SYSTEMS APPROACH TO LIFE CYCLE DESIGN OF PAVEMENTS
E.L. MARVIN, U.S. Army, Construction Engin. Res. Lab., *Champaign, Illinois* 61820

To develop a more rational approach to the design of airfield pavements which includes not only all the initial variables, but also consideration of all variables, over the life cycle of the pavement. The design concepts emphasize the functional requirements of pavement systems.

User requirements will be defined and current design procedures will be evaluated and related to the functional requirements of the pavement system. Where current procedures are deficient, revisions and/or replacements will be made. Transfer functions will be developed to correlate pavement response to performance over the long term. Maintenance strategies for the pavement systems will be considered and models developed to optimize the performance/cost parameter for varying design and maintenance strategies. Feedback procedures will be developed to evaluate and update all subsystems included in the design models.

Supporting agency address information: OCE Construction Engineering Research Lab, Champaign, Il. 61820

SUPPORTED BY U.S. Dept. of Defense - Army

1.0010, V/STOL ORIENTED AERODYNAMIC STUDIES
M.V. MORKOVIN, Illinois Inst. of Technology, School of Engineering, *Chicago, Illinois* 60616 (F44620-69-C-0022)

The AF has functions and operations (logistic support, tactical operations, interdiction, aircrew rescue, etc.) which could be performed more efficiently and, in some cases, only by the use of aircraft with a vertical/short takeoff and landing (V/STOL) capability. While such aircraft have been built and flown in the past, many problem areas still exist in the technology (aerodynamics, flight control, propulsion, vehicle dynamics, etc.) which supports a V/STOL system. The solution of these problem areas is depen-

dent on an improved understanding of the fluid mechanics of the basic physical phenomena. This research is developing the principles, techniques, criteria, and concepts dealing with the basic phenomena of low-speed aerodynamics. A combined experimental and theoretical investigation is being conducted in a number of problem areas dealing with the basic phenomena of stall and separation, maintenance of laminarity, instability and transition, and effective mixing and entrainment. Specifically, the following problems are being investigated, 1) active-roughness tripper (turbulence threshold), 2) test scaling at high lift and minimum-damage trippers, 3) optimal airfoil lift, 4) multiple-jet processes, 5) confined laminar jet mixing, 6) nonlinear, stimulated instability and superentrainment, 7) high-lift generation, and 8) boundary layer changes across discrete suction slots.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0011, TEST OF A SUPERSONIC COMPRESSOR CASCADE

G.D. HUFFMAN, General Motors Corporation, *Indianapolis, Indiana* 46206 (F33615-71-C-1766)

AF function - advanced airbreathing turbine engines. Deficiency - no cascade data exists on supersonic axial compressor airfoils of a type now undergoing investigation in an advanced research compressor stage. Very little cascade data exists for any supersonic compressor airfoils which can be directly compared with data taken from a rotating test. Research - a cascade test will be performed for a supersonic blade element which will also be tested in a complete compressor stage in the aerospace research laboratories. How research contributes - will improve accuracy with which performance of new supersonic airfoils can be predicted for turbine-engine compressor design.

A splitter vane will be added to each blade passage of the cascade tested in the first year of this contract. The vane setting angle will be variable. The cascade will be tested first with suction surface vortex generators, then with the vortex generators removed. The third year of effort will involve velocity measurements made with a laser velocimeter inside a new cascade to determine the internal flow field as well as the exit flow distribution.

Supporting agency address information: Aerospace Research Laboratory LF, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0012, UNSTEADY AERODYNAMIC FORCES ON HIGHLY CAMBERED AIRFOILS MOVING THROUGH GUSTS AT ARBITRARY ANGLE OF INCIDENCE

H. ATASSI, Univ. of Notre Dame, School of Engineering, *Notre Dame, Indiana* 46556 (AF-AFOSR-2675-74)

The prediction of unsteady inviscid flow around airfoils and in cascades, including blade-tc-blade interaction, is a very important prerequisite to the future unsteady analysis of viscous boundary layer problems. It is a vital step to the overall analysis of unsteady flow in turbomachinery. This research effort involves development of a technique to determine the effects of angle of attack, camber, and thickness on the unsteady dynamic response of an airfoil. The airfoil could be oscillating and/or moving through a gust. The first two problems to be attacked are (1) thick oscillating airfoil with lift and (2) unsteady lift forces on a single highly cambered airfoil in a gust. Further extension of the study of these two fundamental problems would be the oscillating wing with a flap and the determination of the unsteady motion and stresses upon a cascade with highly cambered blades.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0013, AERODYNAMICS OF PROTUBERANCES ON SUPERSONIC AIRCRAFT

G.W. ZUMWALT, Wichita State University, School of Engineering, *Wichita, Kansas* 67208 (AF-AFOSR-2459-73)

In order for the AF to carry out its missions, improved aerospace vehicles will be required in the future which will give superior operational capabilities. The performance of such vehicles is dependent on the engineer's ability to predict the forces, heat transfer, moments, etc. that act on the complex, three-dimensional vehicle shapes. Before prediction methods can be developed, a basic understanding of the flow field around the vehicle must be developed. One flow phenomenon that has been encountered in high speed flight is the effect of protuberances (e.g. Housings, pods, bubble windows, scoops, nacelles, etc.) on the flow field around the aircraft. In the high speed flow the protuberances can cause dramatic changes by separating the flow, creating shock waves, hot spots, and affecting aircraft performance, and stability and control. In this research the aerodynamics of protuberances in supersonic flow will be assessed analytically and experimentally. A set of configurations will be selected for study in the 9-inch supersonic wind tunnel with attention given to defining temperature and density gradients near the protuberance as well as effects on aircraft performance and on stability and control.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0014, WAKE STUDIES RELATED TO REENTRY INTO THE ATMOSPHERE

M. FINSTON, Mass. Inst. of Technology, School of Engineering, *Cambridge, Massachusetts* 02139 (F44620-74-C-0025)

The Air Force mission requires aerospace vehicles to be flown at high speeds and high altitudes. The vehicles produce characteristic wakes depending on their design, but the fluid dynamics involved in the production of these wakes are not fully understood. The wakes are important since they determine the base drag on the vehicle and the character of the wake can be used to identify the vehicle. In order to predict the wakes of new designs and analyze flight test data, special model tests have to be conducted where the model support or 'sting' does not interfere with the fluid flow, the same as it is in flight. This research will contribute to the understanding of the influence of vehicle angle-of-attack, model support and model geometry on wake flows in wind tunnels. These studies will be done with an unusual suspension system that uses alternating current magnets to hold the model in place, and therefore the investigators will be able to study the near and far wakes of slender bodies and cones without the physical interference of supporting structures. Current research will study the effect of a gradient in the test section mach number on model force, drag data and the wake configuration, since many other facilities can only carry out tests with accelerating flows in the test section.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0015, HOT PRESSING OF CERAMICS FOR PROPULSION & POWER GENERATION SYSTEMS

G.E. GAZZA, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

Advanced ceramic syntheses are required to reproducibly fabricate silicon nitride and silicon carbide ceramics needed by the Army for critical turbine applications such as vanes and rotors. Commercial availability of these ceramics is limited and further optimization of high temperature strength and creep properties are required. Research will be conducted to evolve synthesis techniques capable of fabricating these materials, up to 4 in. diameter, with the desired properties.

Synthesis of high performance ceramics by pressure sintering techniques will be conducted. Since sintering additives are required for densification of silicon nitride and silicon carbide powders, additives will be used which could increase the refractoriness of the resultant grain boundary phase in addition to promoting complete densification. Starting powders, with and without additives, will be well characterized. Pertinent physical and mechanical properties of the silicon nitride and silicon carbide specimens produced will be determined. Primary emphasis will be placed on continued development of high temperature strength and creep resistance at 2400-2700 degrees F.

Supporting agency address information: AMC Materials & Mechanics Res. Ctr. AMXMR-EO, Watertown, Mass. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

1.0016, OPENING DYNAMICS OF LARGE CARGO PARACHUTES
H.G. HEINRICH, Univ. of Minnesota, School of Engineering, *Minneapolis, Minnesota* 55414 (DAAG17-73-C-0174)

To determine correlation between opening performance theory and field test measurements for large cargo parachutes as used by the US Army. To determine the best input assumptions to the analysis which give adequate prediction of opening forces for large cargo parachutes.

Examine the theoretical analysis which has been in use for prediction of opening performance of personnel sized parachutes and determine necessary modifications to the analysis. Compare results with field test measurements.

Supporting agency address information: TROSCOM Natick Laboratories, Natick, Mass. 01760

SUPPORTED BY U.S. Dept. of Defense - Army

1.0017, STABILIZED LAYERS FOR PAVEMENTS (STABILIZATION OF NATIVE SOIL)
C.D. BURNS, U.S. Army, Waterways Experiment Station, *Vicksburg, Mississippi* 39180

To develop techniques ofr the use of native marginal and submarginal soil and aggregate materials for the construction of roads, airfields, heliports, and storage areas. Determine the most expedient methods for improving or altering the existing physical properties of available materials that do not meet requirements for intended usage. Develop procedures to render marginal materials suitable for construction purpose and prepare of include in a manual for troop use. The procedures developed during this study will be applicable to a wide range of military construction situatins including field fortifications, defensive positions, etc.

By means of office, field, and laboratory studies collect, analyze, and evaluate applicable methods for improvement of material properties. Studies would include such methods as encapsulation, stabilization, blending, modification by additives, reprocessing, etc. Examples of these methods would include the recrushing of existing cemented materials to form aggregates, treatment of unstable aggregates, with coatings to improve durability, use of nonconventional materials, cementing fine-grained materials to improve characteristics, isolation of materials from environments which render them unstable by encapsulation, etc. Evaluate final products incorporating techniques and procedures in manuals suitable for troop use.

Supporting agency address information: OCE Waterways Experiment Station, Vicksburg, Miss. 39180

SUPPORTED BY U.S. Dept. of Defense - Army

1.0018, JET ENGINE FAILURE PREDICTION STUDY
M. SAYBEN, McDonnell Douglas Corporation, *St. Louis, Missouri* 63166 (F33615-74-C-3091)

The lack of ability to predict many types of critical engine failures in military aircraft can cause faulty aircraft to be committed to the mission. The objective of this effort is to develop the spiking theory for an electrostatic probe system which will reliably predict pending engine gas path failures. This is done by the detection of clouds of charged metallic particles which pass through the engine and are apparent in about 50 percent of the failures.

This effort will develop the spiking theory for imminent engine failure prediction using a simple ion probe approach discovered in an AFFDL Laboratory director funded effort. The work to be performed includes- (1) review of all experimental evidence, methods, and results concerning the spike signals from ion probes, (2) to develop theoretical models for the experimental observations and identify significant correlation parameters and physical mechanisms, (3) to evaluate the proposed theories and compare with experimental results, and (4) to define additional experiments for verification of theories.

Supporting agency address information: AF Flight Dynamics Laboratory FGL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0019, REPAIR OF ROADS AND AIRFIELDS IN A WINTER ENVIRONMENT
N. SMITH, U.S. Army, Cold Reg. Res. & Engin. Lab., *Hanover, New Hampshire* 03755

To provide combat engineers with engineering criteria and construction techniques for rapidly repairing damaged roads and airfields in the theater of operations in the winter. Results will be incorporated in TM 5-349 and FM 31-71.

Liaison with Army field units and other DOD agencies will be developed to identify existing requirements, criteria, and techniques for critical review to determine problem areas requiring immediate and major attention. A research program will be conducted in conjunction with these agencies to assess such approaches as; (a) the use of prefabricated panels for breaching shell craters which are either unfilled or filled with indigenous materials, including snow; (b) the use of poured-in-place synthetic materials with high expansion ratios and adequate load supporting qualities to replace or bond together crater debris; (c) new and improved methods for releveling crater perimeters on airfield pavements; and (d) field testing by Army units of the most promising approaches will be scheduled for winter exercises.

Supporting agency address information: OCE Cold Regions Research and Engineering Lab, P. O. Box 282, Hanover, N.H. 03755

SUPPORTED BY U.S. Dept. of Defense - Army

1.0020, WING TIP VORTEX ROLL-UP INVESTIGATION
C. DONALDSON, Aerochem Research Labs. Inc., *Princeton, New Jersey* 08540 (F33615-73-C-3138)

It is known that strong upsetting maneuvers are possible when an aircraft flies into the wake behind another aircraft. The possibility exists that the wake vorticity behind an aircraft may be restructured so as to lessen the wake turbulence hazard in the near wake. The objective of this program is to investigate the vortical flow structure in the near wake so as to develop tractable models of this vortical wake flow.

To conduct a near and far field experimental investigation behind a wing to determine the vortical and turbulent properties of the flow associated with the rollup and formation of the tip trailed vortices. Pressure measurements on the surface of the wing will be analyzed to yield lift, pitching moments, and circulation strength as a function of wing spanwise stations. The wake behind the wing will be traversed and velocity measurements will be made in both the spanwise and vertical directions by means of a measuring device that is sensitive enough to define the turbulent components of the velocity vector.

Supporting agency address information: AF Flight Dynamics Laboratory FGC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0021, LAMINAR INSTABILITY AND TRANSITION IN STRONGLY ACCELERATED BOUNDARY LAYERS
C.D. DONALDSON, Aeronautical Res. Associates, *Princeton, New Jersey* 08540 (F44620-71-C-0004)

The AF will require improved flight vehicles in the future which will give operational capabilities (weapon delivery, reconnaissance, etc.) superior to those of any potential enemy. The performance of such vehicles depends on the ability of the engineer to predict the forces, moments, heat transfer rates, etc. acting on the aerodynamic shape of the vehicle. It is well known that large changes in drag, heat transfer, etc. are encountered when the flow over a surface changes from laminar to turbulent conditions. At the present time the prediction methods which describe this phenomena are not adequate for the range of flows encountered in flight. This year's research will contribute to the basic understanding of the behavior of turbulent flows in the presence of strong pressure gradients with ablation.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0022, RANDOM RESPONSE PHENOMENA ON AIRCRAFT

J.C. HOUBOLT, Aeronautical Res. Associates, *Princeton, New Jersey* 08540 (F44620-74-C-0078)

Air Force vehicles operate in an environment where the effect of random oscillatory air loads such as gusts and turbulence play an important role in determining both the performance characteristics and life of the vehicles. To determine a realistic response of an aircraft in a random load environment, it is necessary to establish the various spectra for input force and moments. For example, for rolling motion it is necessary to find the rolling moment spectra due to the horizontal, lateral and vertical turbulence components. The broad aim is (1) to study how the force and moment inputs depend on the aircraft configuration, (2) to take into account the spatial correlation effects, (3) to find means for deriving appropriate turbulence component spectra and cross-spectra, and (4) to establish input moment spectra for certain basic aircraft configurations. The immediate aim is to establish the nature of the solutions for a few basic cases, and to develop a better understanding of the problem. Also, a critical evaluation will be made of methods of estimating longitudinal and lateral rigid-body response of lightweight aircraft subject to continuous atmospheric turbulence.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0023, THREE-DIMENSIONAL PANEL FLUTTER INCLUDING A TURBULENT BOUNDARY LAYER

J.E. YATES, Aeronautical Res. Associates, *Princeton, New Jersey* 08540 (F44620-71-C-0132)

High performance aerospace vehicles are needed to fulfill functions such as interdiction, air superiority and reconnaissance. Aeroelastic instabilities and flutter are major considerations in achieving the required performance levels of modern vehicles. These instabilities involve both the total vehicle dynamic response as well as individual structural component response. In the latter category structural panel flutter is of prime concern for aerospace vehicles. During the past year the use of Fourier transform methods has yielded simplified expressions for the aerodynamic pressure acting on panels. This pressure is the result of unsteady three-dimensional flow which includes the boundary layer. During the forthcoming year the pressure description will be included into the analysis of panel flutter. Results will be validated by the comparison between the calculated panel flutter response and experimental results obtained by NASA Ames as reported in NASA TN d-4486 and d-5798.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0024, HYPERSONIC AERODYNAMICS

S.M. BOGDONOFF, Princeton University, School of Engineering, *Princeton, New Jersey* 08540 (F44620-71-C-0032)

Air Force flight operations require numerous applications of hypersonic flows around high speed flight vehicles. Particularly, increased understanding of three-dimensional hypersonic turbulent boundary layers is a very important area to the design of aerodynamic surfaces for large, high speed vehicles which may be expected to glide and maneuver. This research is aimed at developing basic knowledge and understanding of these flows. In the current year continued emphasis will be on the determination of the characteristics of hypersonic turbulent boundary layers, in particular, the structure of these flows and their sensitivity to Mach numer, Reynolds number, and disturbances; research on hypersonic flow over cavities will be continued to separate the effects of longitudinal edges of the cavity and the pressure gradients.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0025, REDUCTION OF THE BAT HAZARD TO USAF AIRCRAFT

T.C. WILLIAMS, State University of New York, Graduate School, *Albany, New York* 12203 (AF-AFOSR-2123-71)

The Air Force inspection and safety center has reported 383 instances of USAF aircraft damaged by collision with birds during FY 1971 - 23 more than in 1970. Two of these collisions resulted in major accidents with two crew members killed. Windscreen penetration presents the greatest hazard to aircrews while 26 percent of the collisions directly involved engines which constitutes the largest dollar loss. In the period April through November 1971 there were an additional 619 reported non-damage bird strikes. Over 50 percent of all reported bird/aircraft collisions occurred between the ground and 2,000 feet, with 39 percent in the immediate vicinity of the air field. The majority of incidents again occurred in the southern parts of the U.S. with the greatest number in the southwest. Previous USAF sponsored research has determined that many of the southwestern strikes involve bats rather than birds. Studies as proposed in this effort would lead to a lessening of the dangers of bat-aircraft collisions with a concurrent reduction in expensive repairs and possible loss of life. This project is in direct support of HQ USAF Program Management Directive PMDR-O 2-070-(1) for improved windshield protection.

Supporting agency address information: AF Office of Scientific Research NL, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0026, STATIC AND DYNAMIC BEHAVIOR OF NONCIRCULAR CYLINDRICAL SHELLS

J. KEMPNER, Polytechnic Inst. of New York, School of Engineering, *Brooklyn, New York* 11201 (F44620-74-C-0047)

The AF needs efficient aerospace vehicles of high reliability to fulfill its missions. The economical control of failures in shells, one of the most efficient load carrying members in an aircraft, calls for understanding the states of stress, deformations, and stability accompanying static and dynamic (and consequent fatigue) behavior of shells. Emphasis needs to be directed to the dynamics of shells of variable curvature such as oval shells, as it relates to fuselages, engines, and conventional and variable camber designs of future wings. With regard to engines, the dynamics of turbine blades can be closely modeled by consideration of an open noncircular cylindrical panel (twisted) as a reasonable approximation. The phased study will consist of the investigation of - (1) free vibrations of complete oval shells, 2) free vibrations of open oval shells, 3) steady state and transient forced vibrations corresponding to time-dependent external loads, and 4) the dynamics of twisted shells (turbine blades, wings, etc.). The stresses and deformations resulting from the vibrations will be determined. Dynamic response testing of the oval cylinder will accompany the analytical studies. Some work will also be performed on the buckling and postbuckling of unreinforced and reinforced noncircular cylinders.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0027, HIGH SPEED TURBULENT MIXING AND COMBUSTION

J.H. MORGENTHALER, Bell Aerospace Company, *Buffalo, New York* 14240 (F44620-70-C-0116)

Advanced hypersonic air-breathing and hybrid engines and high power chemical lasers utilizing subsonic and supersonic combustion are required for effective weapon systems in future aerospace missions. This program on investigation of turbulent mixing and combustion processes will assist in engineering design and development of practical injection-mixing systems and combustion chambers for these advanced systems. The research involves theoretical and experimental studies of homogeneous and heterogeneous high speed turbulent mixing and combustion in subsonic and supersonic stream. Practical turbulent mixing and reacting flows will be modeled with emphasis on recirculating flows applicable to rapid expansion (sudden dump) combustors. The recirculating flows will be using experimentally characterized laser- doppler instrumentation and gross flow visualization

techniques, including measurement of both mean and turbulence quantities. Using the experimentally measured turbulence parameters, the semi-empirical mixing models being developed will be validated and their range of applicability extended. Also the reacting core region will be characterized and improved mathematical models developed describing this region. Two-phase flow phenomena will also be investigated including injection of nonhomogeneous and heterogeneous fuels into subsonic and supersonic streams, small boron particle combustion dynamics at subatmospheric pressure, and two-phase flow mixing analyses.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0028, SOLID ELECTRODE STUDIES RELATED TO CORROSION PREVENTION, FUEL CELLS AND BATTERIES

S. BRUCKENSTEIN, State University of New York, Graduate School, *Buffalo, New York* 14222 (AF-AFOSR-2572-74)

Power generation within the Air Force's operational environment rely on electrochemical power sources such as batteries and fuel cells. Corrosion which detrimentally affects Air Force equipment is also involved in electrochemical reactions. This research involves the study of solid electrode surfaces processes, and the phenomena that influences these processes. The results will give a better understanding of the adsorption and formation of products on the surface of the electrodes, as well as the potential corrosion sites. This research deals with the phenomenon of 'underpotential' deposition of one metal on another metal substrate. It signifies an adsorption of a metal ion with some charge transfer at a potential more anodic than the equilibrium potential of the ion in contact with its reduced form in the metallic state. The exact description of these adsorbed species on the electrode surface is to be determined. A model is proposed to identify the adions and adatoms as they exist in the double layer adjacent to the electrode, from the species that would exist on the surface of a (crystal) metal atom in contact with the solution. The existence of such species would have considerable significance in understanding the kinetics of metal corrosion, as well as those of metal deposition and electrocrystallization. A new technique known as electrochemical mass spectroscopy is to be applied to the study of problems requiring the detection of gaseous products. Isotope labelling techniques will be used to study the mechanism of hydrazine oxidation in dimethylsulfoxide.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0029, BREAKING UP OF VORTEX LINES (II)

A. FERRI, New York University, School of Engineering, *New York, New York* 10453 (AF-AFOSR-2497-73)

The Air Force will require improved performance for its future aerospace vehicles used for tactical, strategic, airlift and support missions. Most probably these vehicles will continue to fly in the atmosphere and use air-breathing propulsion. The lifting surfaces-- wings, lifting bodies, compressor and turbine blades, etc-- create a swirling, vortex flow behind them. Thus the vortex flow is basic to aerodynamics but is still not well understood, particularly for the break up process. The breaking up of the rotational motion in the vortex has been shown to be an aerodynamic source of noise and basic to studies of turbulence as well. Therefore designers will require improved models of vortex motion and breakup for several problems, such as higher performance lifting surfaces which generate vortices (wings and compressor blades), quieter engines where one row of blades cuts the vortex wakes of the preceding row, and in modeling the effects of turbulent flow. This effort has found analytical models for the decay and cancellation of vortices and will be continuing work on the three-dimensional breakup process with studies of a flat plate cutting the vortex line.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0030, TURBULENT BOUNDARY CHARACTERISTICS . STRUCTURE OF REATTACHMENT FOR SEPARATED LAMINAR AND/OR TURBULENT BOUNDARY LAYERS (ABBREV)

V. ZAKKAY, New York University, School of Engineering, *New York, New York* 10453 (F33615-72-C-1871)

AF function - supersonic and hypersonic aerospace vehicles. Deficiency - inability to predict heat transfer, surface pressures, and skin friction for a high Reynolds number pure turbulent boundary layer or at reattachment for either the laminar or turbulent boundary layers. Research - supersonic and hypersonic pure turbulent boundary layers at high Reynolds numbers will be investigated. Conditions at reattachment will also be studied. How research contributes - accurate knowledge of a pure turbulent boundary layer at high Reynolds number will assist in arriving at prediction methods to aid the designer of future AF aerospace vehicles. Information will be obtained on reattachment so that airframe components can be better designed to prevent failure due to the high heating rates at reattachment.

Pure turbulent boundary layer research at M equals 6 and Re equals 10 super 9 are experimentals to determine the effects of very high Reynolds numbers on boundary layers. Studies are also being made on a hypersonic laminar boundary layer to determine its state at reattachment.

Supporting agency address information: Aerospace Research Laboratory LH, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0031, OSCILLATING AIRFOILS IN A SUPERSONIC CASCADE

M. KUROSAKA, General Electric Company, *Schenectady, New York* 12305 (F44620-74-C-0040)

Several important AF gas turbine engineering developments have suffered major time and cost penalties due to vibration/flutter problems. A method does not exist for reliably predicting the aeroelastic stability of compressor and turbine blades. This research effort involves development of an analytical method to enable prediction of the supersonic unstalled flutter boundaries for fan/compressors of high performance aircraft gas turbine engines. This could potentially help solve one of the most troublesome aeroelastic stability design gaps. The technical approach is to establish an analytical method with which to compute the flow field of airfoils oscillating at an arbitrary frequency in a supersonic cascade with a subsonic leading edge and to quantify the stability boundary of oscillation.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0032, HIGH SPEED AIR-BREATHING COMBUSTION MECHANISMS

C. ECONOMOS, General Applied Sc. Labs. Inc., *Westbury, New York* 11590 (F44620-71-C-0014)

For weapon delivery at hypersonic speeds, advanced air-breathing propulsion engines incorporating high speed combustion are required capable of wide flight range operation. Combustors involving recirculation phenomena (e.g., sudden expansion or dump burners) are of particular interest. This research will aid in engineering design and development of ignition systems and combustion chambers for these engines. This program involves formulation and evaluation of theories describing chemical kinetics and mixing phenomena in subsonic and supersonic fuel-air flows over wide flight conditions. Included will be investigation of transport phenomena in nonreacting and reacting flows. Mechanisms will be studied for accelerating and enhancing mixing and combustion processes to minimize length for combustion completion, including combustion kinetics enhancement by (1) coupling of chemical and mass transport processes with pressure distribution and geometric effects and with heterogeneous interphase transport effects, including particulate phase evaporation, combustion and diffusion, (2) decelerating a supersonic stream to a subsonic combustion field by distributed heat release without incurring the usual strong shocks, (3) mixing acceleration by inducing turbulence, (4) chemical and thermal enhancement using heterogeneous mixtures and coated particles to provide

staged ignition and combustion to ignite and burn metals. Also studied will be (1) coupling of mechanisms describing ignition, combustion and mixing processes associated with direct injection of multi-phase fuels into high speed air streams, (2) effect of added fuel injection distribution on pressure, velocity and temperature fields, (3) effect of subsonic sudden expansion combustion area and step size, pressure and flow velocity variations on injection and mixing, flame stabilization, spreading and axial propagation and combustion efficiency.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0033, HIGH REYNOLDS NUMBER TRANSONIC TESTING TECHNIQUES

J.D. LEE, Ohio State University, School of Engineering, *Columbus, Ohio* 43212 (F33615-71-C-1911)

AF function - the mission of ARL is to conduct in-house research, supported by contracted efforts, in the areas of physical and engineering sciences which offer the greatest potential for the operational capability of the AF. Deficiency - there is presently no testing capability in high Reynolds number transoinc flows and no theories exist for determining aerodynamic loads on aircraft for such conditions. Research - methods will be studied for the generation of transonic turbulent test flows and the diagnostics of flow conditions about test models in a Mach number range from 0.6 to 1.2 and Reynolds numbers per foot exceeding 100 million. The research is concerned with aerodynamic testing methods of the long duration blow-down type as opposed to the impulse type. Special consideration is given to wall interference effects, suppression of noise and vibrational and transient loads on models and structures. How research contributes - the results of this research are directly applicable for the design of transonic ground test facilities for aerodynamic testing in air flows of turbulent character which will provide experimental data on aerodynamic loads presently not available.

Investigate problems of high Reynolds number transonic testing in wind tunnels of blow-down type and evaluate the validity of data obtained on test models in ventilated test sections of such type facilities. Study means of producing a test flow with acceptable levels of angularity, free stream turbulence and noise. Compare the effectiveness of slotted against perforated test section walls for both shock attenuation and noise reduction. Develop testing techniques for attainment of meaningful test data in the specified flows. Flow visualization, force and moment measurement techniques shall be included in the investigations. Study merits of the Ludweig tube concept for turbulent transonic testing vs longer duration type transonic tunnels.

Supporting agency address information: Aerospace Research Laboratory LF, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0034, CONTINGENCY POWER STUDY

J. GONSOLVES, Boeing Company, *Philadelphia, Pennsylvania* 19142 (DAAD05-74-C-0752)

Analyze and estimate the potential survivability benefits of contingency power capabilities for various twin-engine aircraft under one engine inoperative (OEI) conditions, and to establish one or more practical methods of providing such capabilities.

A. Analyze accident and combat data for power-loss incidents in twin-engine aircraft and obtain plot of percent hypothetical power increase vs. percent reduction in major accidents. B. Analyze propulsion system data and airframe requirements in current and development turboshaft engines. Determine conditions that must govern operational usage of a contingency power system. C. Establish a generic design concept to provide available emergency power capability and control under OEI conditions.

Supporting agency address information: AMC Ballistic Research Labs, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

1.0035, DIFFUSION FLAMES AND SUPERSONIC COMBUSTION MECHANISMS

A. LINAN, Inst. Nac. De Tec. Aerospacial, *Madrid, Spain* (AFAFOSR-2254-72)

For weapon delivery at hypersonic speeds, advanced air-breathing and hybrid engines incorporating supersonic/hypersonic combustion are required for aerospace vehicle and missile propulsion. This research on mechanisms involved in the interrelation between fluid flow and chemical kinetics in premixed and diffusional combustion will aid in understanding and controlling diffusion-limited combustion processes and in engineering design and development of practical combustors for these advanced engines. A theoretical study is being made of turbulent shear flow between two initially unmixed streams, with emphasis on hydrogen combustion in a supersonic air stream, on the structure of diffusion flames, on heterogeneous ignition and combustion of solid propellants, and on liquid droplet decomposition and ignition. Analyses of laminar diffusion flames are also included. A principal objective is understanding the role of laminar chemical kinetics in ignition delay for flame detachment distance, in mixing, recirculation zones, in turbulent vorticity, and in turbulent combustion. Conversely, the effects of density, stream velocity, turbulence and temperature on reaction rates and concentrations are being studied. Several mathematical approaches are used including singular perturbation methods, in which reaction rate ratios, ratio of system to activation temperatures, small pockets of pure gas, or pressure or concentration changes, are used as perturbations, and their relaxation times, temperature history and flame structures determined.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0036, TRANSONIC UNSTEADY AERODYNAMICS FOR TWO DIMENSIONAL AIRFOILS

J.M. WU, Univ. of Tennessee, School of Engineering, *Knoxville, Tennessee* 37916 (F33615-73-C-3119)

The performance and reliability of transonic aircraft are greatly influenced by structural dynamic problems such as flutter. The objective of this effort to reduce the cost of providing system functional reliability and operational effectiveness by providing new analysis techniques to supplement earlier requirements for transonic experiments.

Contractor will select and investigate the numerical implementation of one of several possible techniques- parametric differentiation, variational methods, ray tracing, layered media, local linearization, unsteady method of characteristics. Pilot computer programs will be developed to assess their potential for future development.

Supporting agency address information: AF Flight Dynamics Laboratory FYS, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0037, AEROELASTICITY STABILITY OF THIN SHELL STRUCTURES AT SUBSONIC MACH NUMBERS AND THE ACTIVE SUPPRESSION OF FLUTTER PHENOMENA

R.O. STEARMAN, Univ. of Texas, School of Engineering, *Austin, Texas* 78712 (AF-AFOSR-1998-71)

Future Air Force flight vehicles will require improved knowledge of aeroelastic phenomena in order to satisfy performance and mission requirements. The design of structural systems to avoid the occurrence of flutter within the mission profile is now and will continue to be a prime system design goal. Knowledge of the cause and effect phenomena involved and the identification and study of the principal structural and aerodynamical parameters will provide the data upon which to base reliable structural design. This research program involves three tasks: (1) the experimental study of thin-walled cylindrical shell flutter, (2) the investigation of active suppression control systems in interfering lifting surface flutter, and (3) the investigation of configuration changes on turbine and compressor blade flutter. The last two tasks are theoretical studies.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0038, THE DEVELOPMENT & APPLICATION OF A SIMPLE METHOD FOR DETERMINING UNSTEADY AIRLOADS IN SUBSONIC COMPRESSIBLE FLOW 11695-E
W.P. JONES, Texas A & M University System, School of Engineering, *College Station, Texas* 77843 (DAHC04-74-G-0184)

To study unsteady aerodynamic theory relating to the determination of the airloads on aircraft and helicopters in high speed subsonic flight. Work in progress at AMRDL-Langley for predicting lifting surface loads on hovering and advancing rotors is similar to the approach proposed by Jones and Rao. This proposal is directly related to developing technology for reducing both cost and time in performing load analyses on Army helicopters.

A simple numerical lifting surface technique based on the velocity potential formulation for calculating the aerodynamic coefficients on oscillating wings and advancing rotors is to be utilized.

Supporting agency address information: OCRD Army Research Office, Box CM, Duke Station, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

1.0039, PARAMETRIC AND NONLINEAR MODE INTERACTION BEHAVIOR IN THE DYNAMICS OF STRUCTURES
A.D. BARR, Univ. of Dundee, *Dundee, Scotland, United Kingdom* (AF-AFOSR-2723-74)

Air Force flight vehicles require that improved knowledge and understanding of the dynamic behavior of structures be achieved so that future systems can be designed safely. Increasing performance requirements will dictate that designs have better stiffness to weight ratios and have high confidence levels associated with dynamic response predictions. Such systems will require an understanding of structural parametric response. Improved frequency separation criteria, for example, can emerge which assist dynamic performance improvements. This research project will experimentally investigate and correlate parametric and nonlinear structural vibrations. Structural systems relevant to aircraft will be used.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0040, DEVELOPMENT OF HIGH TEMPERATURE COMPOSITE AIRCRAFT WHEEL
R.A. RANDOLF, Hercules Incorporated, *Magna, Utah* (F33615-74-C-3040)

Military aircraft wheel maintenance and replacement costs are high due to their limited service life caused by stress corrosion and fatigue. The objective of this work unit is to develop and test an aircraft wheel from composite materials which will provide significantly stress corrosion and fatigue characteristics and which will satisfactorily perform in the high temperature environment produced by advanced brake systems. Successful development and use of a composite wheel is projected to provide significant improvement of wheel reliability, a major reduction of wheel cost and a reduction of wheel weight by 30 by 40 percent.

A typical military aircraft wheel will be selected for development work. A contract will be initiated for the development, design, fabrication and basic testing of a composite wheel. On a repeat basis until a wheel is accepted, the contractor will submit fabricated wheels for AFFDL Laboratory testing under a sepatate in-house work unit. After a wheel has passed AFFDL testing a fianl report will be written.

Supporting agency address information: AF Flight Dynamics Laboratory FEM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

ASTRONAUTICS

Includes Astronautics (general); Astrodynamics; Ground Support Systems and Facilities (space); Launch Vehicles and Space Vehicles; Space Transportation; Spacecraft Communications; Command and Tracking; Spacecraft Design, Testing, and Performance; Spacecraft Instrumentation; and Spacecraft Propulsion and Power. For Related Information See Also Aeronautics.

2.0001, ORBIT DETERMINATION IN THE PRESENCE OF UNMODELED ACCELERATIONS
B.D. TAPLEY, Univ. of Texas, School of Engineering, *Austin, Texas* 78712 (AF-AFOSR-2233-72)

Fundamental to satellite orbit determination and prediction is modern estimation theory. However, there are still problems precluding the effective utilization of this theory. In particular, the problem of unmodelled accelerations is still one of difficulty. The 14th Aerospace Force (ADC) has requested new methods to attack this problem to satisfy their operational requirement of generating precision orbits and precision predictions in the high drag regime. This research program will be devoted to the determination of such methods. Parametric dynamic drag models, as well as simplifications to these models, will be considered to determine the best model for estimation and long range orbit prediction, preferably one allowing separation of the effects of gravitational and drag forces. Study will be continued to develop an adaptive algorithm for sequentially estimating the state noise covariance matrix, and a comparison between this and a new adaptive batch mode algorithm will ensue. The characteristics of various numerical methods for propagating the covariance matrix will be investigated to identify the best procedure under several conditions. A general comparison of batch and sequential estimation algorithms will be continued to determine which method is best suited for on-line orbit determination.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Materials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, DESIGN AND FABRICATION OF LIGHTWEIGHT, IMPACT-RESISTANT DRIVE SHAFTING (SANDWICH WALL), ARMY HELICOPTERS
C.F. GRIFFIN, Lockheed Aircraft Corporation, *Burbank, California* 91503 (DAAJ02-74-C-0022)

Composite materials, with greater specific stiffnesses than metals, offer the potential of lowering the weight of tail rotor drive systems for future Army helicopters. The increased stiffness allows longer shaft sections, thereby reducing the number of bearings, couplings, hangers, etc. The objective of this contract is to design and fabricate a maximum length tail rotor drive shaft section, with designed-in resistance to ballistic and low velocity impacts.

A composite drive shaft, with sandwich wall construction, will be designed and fabricated. The sandwich wall will consist of a syntactic foam core, with graphite/ epoxy face sheets. Two shafts will be fabricated and tested. Upon successful completion of the tests, five additional shafts will be fabricated and delivered to the Army for testing in parallel with shafts being fabricated under two parallel contracts.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

3.0002, THE CHEMISTRY OF MATERIALS UNDER EXTREME ENVIRONMENTAL CONDITIONS
W.F. LIBBY, Univ. of California, School of Engineering, *Los Angeles, California* 90024 (AF-AFOSR-2019-71)

The Air Force missions, both in aircraft and missiles, subject materials to unusual environmental stresses such as extremes of temperature, pressure, and radiation. This research involves the basic chemistry of materials subjected to such extreme conditions, and the results will contribute to the development of new and improved materials. It includes studies of the effects of extreme pressures in promoting chemical reactions, together with studies on polymeric products obtained from gamma radiolysis of simple hydrocarbons which will be useful in developing radiation resistant polymeric materials. Investigations of the mechanisms of heterogeneous catalysis and high temperature studies of carbon vapor species are also included in this research effort.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0003, HOMOGENEOUS AND HETEROGENEOUS HYDRAZINE DECOMPOSITION FOR MONOPROPELLANT PROPULSION SYSTEMS
S. BENSON, Stanford Research Institute, *Menlo Park, California* 94025 (F44620-73-C-0069)

This work is in direct support of RO 5.1.5 in the study of hydrazine catalysis. Present monopropellant control rockets on AF systems have a longevity problem during intermittent operation related to a lack of understanding of the basic mechanism inherent in catalytic hydrazine decomposition catalysis. The present effort will characterize the mechanisms of homogeneous and heterogeneous hydrazine decomposition, including catalysis by iridium. The effects of different adsorbates will be measured in relation to hydrazine catalysis from 150 to 1000 degrees K. Auger electron spectroscopy will be employed for elemental analysis. The data will be correlated and analyzed to elucidate the probable mechanisms for the loss of activity by iridium catalysts.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0004, BURNING RATE MECHANISMS OF SOLID PROPELLANTS
D.W. NETZER, U.S. Navy, Postgraduate School, *Monterey, California* 93941

To investigate and model the combustion of solid propellants in standard and high acceleration environments.

Study double-base and composite propellants and propellant sandwiches in (a) optically equipped combustion bombs, (b) a high acceleration centrifuge, and (c) an optically equipped, centrifuge mounted combustion bomb. High speed color motion pictures and Schlieren are taken with both mercury arc and laser light sources.

Supporting agency address information: Naval Ordnance Systems Command 0331B, Washington, D.C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0005, HOLOGRAPHIC CHARACTERIZATION OF CERAMICS
J.R. BOHN, T R W Incorporated, *Redondo Beach, California* 90278 (N00019-73-C-0298)

To explore the uses of holography and holographic interferometry as tools for the characterization of ceramics, both raw materials and finished parts, to foster recognition and control of those parameters affecting structural reliability.

Holography, holographic microscopy, holographic interferometry and correlation techniques will be used to facilitate or simplify examination of particles, aggregates and ceramic pieces at various stages of processing, especially in dynamic circumstances previously not open to view.

Supporting agency address information: Naval Air Systems Command 52032A, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0006, ADVANCED ELECTRO/OPTICAL SYSTEMS MATERIALS
M.H. KAUFMAN, U.S. Navy, Weapons Center, *Ridgecrest, California* 93555

To develop advanced materials for electronic, optical, and electro- optical systems. Present emphasis is the development of an acceptable dome for the modified AS-899 antenna.

IR window: Follow-up preparation and evaluation of previously generated leads for prospective near IR window materials. Copolymerizations based upon highly halogenated monomers. Preparation and evaluation of high melting polyhydrocarbons. Domes: Fabrication of laminates from low dielectric constant, low loss factor resins and reinforcements. Economy is important as are electrical and physical characteristics. Target is an acceptable dome having a dielectric constant of about 3.0.

Supporting agency address information: Naval Electronic Systems Command 0332, Washington, D.C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0007, DESIGN AND FABRICATION OF LIGHTWEIGHT, IMPACT-RESISTANT DRIVE SHAFTING, (SINGLE WALL), ARMY HELICOPTERS
J.E. HILZINGER, Whittaker Corporation, *San Diego, California* 92123 (DAAJ02-74-C-0021)

Composite materials, with greater specific stiffnesses than metals, offer the potential of lowering the weight of tail rotor drive systems for future Army helicopters. The increased stiffness allows longer shaft sections, thereby reducing the number of bearings, couplings, hangers, etc. The objective of this contract is to design and fabricate a maximum length tail rotor drive shaft section, with designed in resistance to ballistic and low velocity impacts.

A composite drive shaft will be designed and fabricated utilizing pre-impregnated graphite fibers. The shaft will be covered with a low velocity impact resistant layer consisting of crushable honeycomb and a thin plastic outer skin. Two shafts will be fabricated and tested. Upon successful completion of the tests, five additional shafts will be fabricated and delivered to the Army for testing in parallel with shafts being fabricated under two parallel contracts.

Supporting agency address information: AVCOM Eustis Directorate, US Army Air Mobility R&D Lab, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

3.0008, MATRIX ISOLATION NMR SPECTROSCOPY- A NEW TECHNIQUE FOR DETERMINING THE STRUCTURE OF METASTABLE MOLECULES 11118-C
C.S. YANNONI, Internat. Bus. Machines Corp., *San Jose, California* 95114 (DAHC04-73-C-0014)

To devise a new variation of high-resolution pulsed nuclear double resonance in solids which will serve as a basis for the development of matrix isolation nuclear magnetic resonance (NMR). The successful development of the proposed techniques could lead to the direct determination of the identity and structure of metastable species produced by photolysis, combustion, thermolysis, etc., and would be applicable to the Army's interest in photochemistry, explosives, and propellants.

Matrix isolation NMR spectroscopy will be applied to the study of metastable species which should permit a direct determination of molecular geometry. In addition, the high-resolution pulsed double resonance NMR technique will be applied to the study of polymers.

Supporting agency address information: OCRD US Army Research Office, Box CM, Duke Station, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0009, FUNDAMENTAL MECHANISMS OF DIVERGING DETONATION WAVES AND COMBUSTION DYNAMICS OF DETONATION LASERS
J.H. LEE, McGill University, *Montreal, Quebec, Canada* (AFAFOSR-2387-72)

For weapon delivery and defense, surveillance and communication, advanced stable high specific power airbreathing, rocket and composite engines for aerospace and missile propulsion, high rate energy conversion explosive weapons, and high power gas and chemical lasers are required. This research encompasses studies of mechanisms of formation, transition, propagation and stability of normal, cylindrical and spherical diverging detonation waves and blast wave propagation in reacting gaseous mixtures and the gasdynamic flow structure in unconfined vapor cloud combustion and detonation. Also investigated will be the feasibility of population inversion and achievement of powerful infrared, self-sustained chemical laser emission under detonation combustion flame and blast wave conditions and assessment of development of instabilities leading to inhomogeneities in the chemical laser media. Unconfined detonation wave research will include experimental and theoretical investigations of the strong

nonlinear coupling between transient hydrodynamics and chemical reaction phenomena associated with different regimes of shock wave propagation in detonating media. A complete analytical description will be made quantitatively describing experimental observations. Complimentary studies will be made of fundamental processes of laser spark and flash photolysis ignition in reacting gases and subsequent development of the combustion and detonation phenomena, including instantaneous initiation and associated instabilities of unconfined detonation waves, transient structure of spherical detonation front in nonuniform media, and diffracting spherical detonation waves.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0010, LATTICE DYNAMICS IN AMMONIUM PERCHLORATE
T.B. BRILL, Univ. of Delaware, School of Arts, *Newark, Delaware* 19711 (AF-AFOSR-2131-71)

This work supports the critical RO 5.1.3 in its examination of the fundamental energetic properties of the principal rocket oxidizer, ammonium perchlorate. This research is aimed at determining in a fundamental sense the effect of temperature, pressure and catalytic dopants on the crystal lattice of the ammonium perchlorate. The light scattering technique of laser raman spectroscopy is being employed to determine the dynamics of the compound from the standpoint of lattice vibrations. The variable temperature work will aid in defining mechanisms of temperature sensitivity and aging of the oxidizer. An orientational dependence study of the lattice dynamics yields information on the sensitivity of the ammonium perchlorate to directional stress. The pressure dependence work relates directly to the combustion process because the propellant is known to liquify under pressures similar to the propellant combustion chamber, and also to the aging problem due to crystalline modifications. The study of catalytic dopant effects on the crystal lattice is fundamental to combustion mechanisms, particularly as related to the low temperature decomposition of the ammonium perchlorate to ammonia and perchloric acid.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0011, CHEMICAL KINETICS OF SELECTED FLUORINE REACTIONS
J.B. LEVY, George Washington University, School of Arts, *Washington, District of Columbia* 20006 (AF-AFOSR-1939-70)

Improved performance of propulsion systems can be obtained through the use of more energetic rocket propellant ingredients. Fluorine and many fluorine compounds are excellent possibilities since they are among the highest energy compounds known. Yet little progress has been made in this direction due to the difficulties in storage, manufacture, handling and combustion of these compounds and in the highly corrosive products which are produced by their use. Some of these difficulties may be overcome by this research which will determine the rates and mechanisms for reactions involving several of these compounds. Additionally the knowledge obtained here will provide an increased understanding of the reactions involving highly inert fluorine containing polymeric materials. Specifically the equilibrium reaction of bistrifluoromethyl peroxide with trifluoromethyl hydrofluorite and carbonyl fluoride and the fluorine-perfluoro cyclobutane system, which is an example of a bimolecular homolytic displacement reaction on carbon, have been studied. Studies will continue on other examples of this latter reaction between fluorine and fluorocarbons, on equilibrium reactions of compounds such as trifluoromethoxy hypofluorite, bistrifluoromethyl trioxide and trifluoromethyl hypofluorite, and on fragmentation reactions of perfluoroethoxy and perfluoroisopropoxy radicals.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0012, NAVAL VEHICLE TECHNOLOGY - FUNDAMENTALS OF ADHESION
W.D. BASCOM, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

To improve the reliability of adhesive bonds for use in naval aircraft. The use of structural adhesives in aircraft offers many advantages over other fabrication methods, but the bonds are susceptible to attack by moisture and to fatigue failure. Rational approaches to solving these problems require a knowledge of failure mechanisms.

The effect of water on bond strength is investigated using double cantilever beam specimens and simple unnotched butt joints. Variables will include adhesive resin composition, metal type and prebonding treatment of the metals. The metal surfaces will be examined before bonding and after failure using scanning electron and light microscopy, as well as Auger electron spectroscopy.

Supporting agency address information: Naval Air Systems Command (52032), Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0013, CORROSION PREVENTION MATERIALS
D.E. FIELD, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

To develop a protective, hydrophobic, soil-resistant, highly inert aircraft finish based on fluorinated urethane and epoxy polymers. Whereas earlier work has stressed topcoat development, the continuation will seek improvement of the total finishing system, inclusive of primers, sealers and topcoats.

Apply the science of fluoroorganic chemistry to known epoxy- urethane chemistry to produce polymers suitable for primers, sealers and topcoats. Formulate coatings from those polymers having the best properties to meet the above objective. Investigate the physical and protective properties, durability, weathering, adhesion, and cleansability of the finishing system.

Supporting agency address information: Naval Air Systems Command (AIR-52032A), Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0014, NAVAL VEHICLES & MATERIALS SUPPORT TECHNOLOGY - FRACTURE AND PROJECTILE IMPACT RESISTANCE OF CERAMIC AND GLASS
S. FREIMAN, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

The objective of this program is to determine the effects of composition, microstructure and processing of glasses and ceramics on crack propagation behavior and related mechanical properties.

The relationship between strain energy release rate, g, and rack velocity will be determined for various materials and correlations made with strength and acoustic emission measurements. Scanning electron microscopy will be used to examine the fracture surfaces and establish the microstructural relationship to the mechanical properties.

Supporting agency address information: Naval Research Laboratory (8000), Washington, D.C. 20375

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0015, CRACK PROPAGATION IN AIRCRAFT STEELS
J.M. KRAFFT, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

This project will develop and define a comprehensive test methodology for assessing the susceptibility of high strength materials to corrosion initiated and catalyzed failures.

Both static and cyclic loading spectrums will be employed to study crack initiation from the pre-existing notch in a compact tension specimen. The combined effects of various aggresive environments and notch acuities will be examined.

Supporting agency address information: Naval Air Systems Command (320), Washington, D.C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0016, CENTRIFUGAL FORCE AND REYNOLDS NUMBER EFFECTS ON COMBUSTION PROCESSES
G.D. LEWIS, United Aircraft Corporation, *West Palm Beach, Florida* 33402 (F44620-73-C-0061)

For AF functions of weapons delivery and defense, transport and reconnaissance, advanced air-breathing and hybrid engines are required for missile and aircraft propulsion. There are stringent restrictions on size, weight, and pressure drop for certain of these applications. Proper application of centrifugal force to enhance the rate of flame spreading in a swirl burner could conceivably provide smaller, lighter, more efficient, much higher through-flow main burner and augmenter combustor capable of operation over wider ranges of conditions, with substantially less pollutant emissions than available with today's conventional burners. This research will acquire fundamental understanding of effects of centrifugal force and Reynolds number on rate of flame spreading and limits of combustion in high centrifugal force fields. The program will generate needed experimental data and an analytical model based both on the generated data and those available from complementary continuous flow studies. The experimental program will employ a combustion centrifuge to produce centrifugal force fields up to 4000 g. Rate of flame propagation within the centrifuge will be measured with ionization probes and tape recorded for later analysis. Testing will be conducted at pressures from 3 to 50 psia and temperatures from -100 degrees F to plus 100 degrees F. In addition, the flame front shape will be evaluated using simultaneous measurements from ionization probes and with a variety of fuels, i.e, propane, methane, and hydrogen. The experimental data will be formulated into an analytical model of the flame spreading process including definition of the combustion limits. This model will be evaluated against and modified with information from the steady flow applied research programs proceeding simultaneously.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0017, WEAPONRY - SYNTHESIS AND CHARACTERIZATION OF NEW COMPLEX LIGHT METAL HYDRIDES
E.C. ASHBY, Georgia Inst. of Technology, School of Chemistry, *Atlanta, Georgia* 30332 (N00014-67-A-0159-0005)

New or improved chemical rocket propellants are needed for the propulsion systems of Navy vehicles for tactical and surveillance missions in the atmosphere and nearby space. This task, in seeking new hydrides as candidate ingredients for solid propellants, may contribute significantly to the fuel portions of rocket propellants at higher energy levels.

Study the stability of diethyl ether soluble aluminum hydride, discovered under this contract, and its use in the synthesis of other simple and complex metal hydrides. Continue the preparation and characterization of complex metal hydrides of copper and initiate studies on new complex hydrides of beryllium. The investigation of the use of metal hydride anions in metathetical reactions leading to complex hydrides.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0018, DETERMINATION OF THE ACOUSTIC RESPONSES OF SOLID PROPELLANTS BY THE IMPEDANCE TUBE METHOD
B.T. ZINN, Georgia Inst. of Technology, School of Aerospace Engin., *Atlanta, Georgia* 30332 (AF-AFOSR-2571-73)

This research supports RO 5.1.1 in the experimental study of solid propellant combustion instability. The research is concerned with the development of a new experimental technique for the accurate measurement of the unstable properties of various solid propellants used in USAF missile systems. Accurate knowledge of this data is needed for the prediction of missile stability in the design stage. The experimental technique is based upon the impedance tube technique. It is expected that the method will offer the following advantages over currently used techniques - (1) it will provide more accurate data, (2) the same experimental setup will be used for testing propellants at different frequencies, (3) all propellants will be tested at the same frequencies and under the same growth rate conditions, (4) the method will be capable of measuring the acoustic responses of aluminized and weakly unstable solid propellants, (5) it will be able to determine particle gas phase losses simultaneously with measuring the propellant admittance, and (6) it will provide data that could be used to check the accuracy of data obtained to date with conventional t-burners.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0019, THE USE OF OXYGEN SEVENTEEN TRACER TECHNIQUES IN STUDYING THE PROPERTIES AND CHEMISTRY OF VARIOUS OXIDIZERS
I.J. SOLOMON, I I T Research Institute, *Chicago, Illinois* 60616 (F44620-72-C-0041)

The performance of weapons delivery systems using storable liquid propellants can be improved by eliminating the problem of oxidizer corrosion, caused by the impurities present in the nitrogen tetroxide. Also, combustion reactions of nitrogen containing fuels and certain environmental pollution reactions can be better understood by the elucidation of the basic properties of all of the nitrogen oxides. NMR and EPR spectra will be determined for oxygen seventeen enriched samples of nitrous oxide, nitric oxide, nitrogen dioxide, nitrogen trioxide, nitrogen tetroxide and nitrogen pentoxide. These spectra with a combination of other techniques will allow the species present in the commercially delivered oxidizer to be monitored. Additionally the synthesis and proof of the structure of a new and different functional group will be undertaken. Preliminary experiments suggest that for the first time the pernitrate group (ONO3) has been synthesized. This functional group could potentially be of interest in new propellants, and new explosives. Several synthesis schemes will be attempted and, if successful, compounds with one or more pernitrate groups will be made. Attempts to produce the oxyperchlorate group (OClO4) will also be made.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0020, NAVY VEHICLE DESIGN AND CONSTRUCTION - MEASUREMENT OF RESIDUAL STRESSES
J.B. COHEN, Northwestern University, School of Technology, *Evanston, Illinois* 60201 (N00014-67-A-0356-0008)

The service life of critical naval components such as gears, bearings, and helicopter blades depends, in part, on the surface residual stresses developed by heat treatment and fabrication. For best fatigue life it is important to measure and control these stresses. This research will develop needed information on microstructural factors which influence the measurement of residual stresses and on the nature of the plastic zone ahead of a fatigue crack.

The role of texture on x-ray measurement of residual stresses will be determined in high strength, high alloy steels. A correction will be made in the stress measurement which takes into account anisotropy in the elastic constants. The zone ahead of a fatigue crack in 4340 steel will be analyzed using a microbeam x-ray technique to give information on residual stresses and structural changes as local deformation occurs.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0021, SUPER HYDRIDES 11437-C
H.C. BROWN, Purdue University, School of Science, *Lafayette, Indiana* 47907 (DA-ARO(D)-31-124-73-G148)

To establish the chemistry of super hydrides and to provide a basis for understanding the factors which are responsible for their unexpected properties. The selective character and powerful reducing ability of these new super hydrides are highly relevant to all Army laboratory research where organic and inorganic synthesis is performed. The compounds under study are pertinent to the

military problem area of high energy substances, specifically with respect to the fuel component of propellants.

Recent research has established that lithium triethylborohydride is a super nucleophile, far superior to lithium borohydride and lithium aluminum hydride. It is proposed to explore the chemistry of lithium triethylborohydride and representative members of related trialkylborohydride now readily available through recent developments in the synthesis of organoboranes of known structures.

Supporting agency address information: OCRD US Army Research Office, Box CM, Duke Station, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0022, SEPARATION OF NITRATE ESTERS, NITRO AND NITROSO COMPOUNDS BY HIGH SPEED LIQUID CHROMATOGRAPHY

J.O. DOALI, U.S. Army, Ballistic Research Lab., *Aberdeen Proving Ground, Maryland* 21005

The objective of this task is the development of high speed liquid chromatography (HSLC) as an analytical tool for the study of energetic compounds. Specific goals are the completion of the study of the quantitative parameters associated with HSLC, the development of procedures for the analysis of stabilizers in CMDB propellants, and the development of a procedure for the determination of nitroguanidine in triple-base propellants. In addition, the new commercially available substrates, such as the microparticulate adsorpents (5 microns diameter) and micro-particulates with permanently bonded stationary phases, will be evaluated.

Analytical problems dealing with propellants and explosives are often difficult and at times imprecise. Particularly, most of the thermally labile and nonvolatile materials are now determined by thin layer chromatography. While this technique is rapid, quantitative determination can be difficult. The energetic compounds in question will be separated by high speed liquid chromatography. This technique offers the possibility of combining the speed of thin layer chromatography with the precision of vapor phase chromatography and therefore providing a much needed analytical tool to the propellant and explosives chemist.

Supporting agency address information: AMC Ballistic Research Labs, Aberdeen Proving Ground, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

3.0023, SURVEY OF THE CHEMICAL KINETICS OF DOUBLE BASE PROPELLANT IGNITION

E. FREEDMAN, U.S. Army, Ballistic Research Lab., *Aberdeen Proving Ground, Maryland* 21005

To establish the essential chemical reactions that must be taken into account in any attempt to model the ignition of a double base propellant, and to determine or estimate numerical values for the activation energy and pre-exponential factors of these reactions.

A literature search will be made for all of the reactions that have been studied or postulated in connection with the thermal decomposition of cellulose nitrate; where possible, the mechanisms and rates of these reactions will be noted. A comprehensive numerical mathematical model for the ignition and combustion of double base propellants which is now being completed will be used to determine the sensitivity of measured ignition or burning rates to the parameters of the various reactions.

Supporting agency address information: AMC Ballistic Research Labs, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

3.0024, KINETICS OF DECOMPOSITION OF PROPELLANTS AND EXPLOSIVES AT HIGH PRESSURES AND TEMPERATURES

N.J. GERRI, U.S. Army, Ballistic Research Lab., *Aberdeen Proving Ground, Maryland* 21005

This work is designed to provide an efficient technique of digital or hybrid computation in order to evaluate the individual kinetic parameters, and the overall rate equation for those complex mechanisms associated with the rapid decomposition of high energy fuels, propellants and explosives.

The general approach will be to arbitrarily assign Arrhenius parameters to the individual steps in the mechanism and allow the computer to solve the series of differential equations which describe the assumed course of the reaction. The results of the computations are compared with experimental data and an error function is calculated and the parameters readjusted.

Supporting agency address information: USA Ballistic Research Laboratories, Aberdeen Proving Ground, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

3.0025, EXPERIMENTAL STUDIES OF THE TRANSIENT BURNING OF NITROCELLULOSE PROPELLANT

J.D. KNAPTON, U.S. Army, Ballistic Research Lab., *Aberdeen Proving Ground, Maryland* 21005

The objective is to obtain experimental data on the burning rates of nitrocellulose type propellants as a function of large pressure transients.

Two constant volume chambers joined with a burst diaphragm will be used for investigating the effects of large pressure transients. The first chamber will serve as a source of high pressure gas. The second chamber will contain the burning propellant sample under study and will be instrumented to measure the instantaneous linear burning rate, pressure, and pressure wave characteristics. Propellant burning in the first chamber will generate high pressures sufficient to burst the diaphragm, causing a pressure wave to travel through the second chamber. Simultaneously, stick propellant will be burning along the axis of the second chamber. The pressure wave from the first chamber, as it passes through the second chamber, will be monitored with pressure gauges. The anticipated differences between the transient burning rates and the steady state burning rates (obtained from constant pressure measurements) will be interpreted in a concurrent subtask.

Supporting agency address information: AMC Ballistic Research Labs, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

3.0026, EFFECT OF HEATING RATE ON THE DECOMPOSITION OF PROPELLANT INGREDIENTS

J.J. ROCCHIO, U.S. Army, Ballistic Research Lab., *Aberdeen Proving Ground, Maryland* 21005

To provide a self-consistent set of experiments to evaluate the effect of heating rate on the indentity and relative amount of propellant thermal decomposition products. This information will add to the data base required for modeling of the propellant ignition process.

The initial phase of this study will be devoted to nitrocellulose, using samples which are well characterized as to purity and percent nitrogen. The techniques to be used are thermogravimetry/mass spectroscopy and a platinum resistance probe coupled with a gas chromatograph/mass spectrometer.

Supporting agency address information: AMC Ballistic Research Labs, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

3.0027, CORRELATION OF INTRINSIC THERMAL STABILITY WITH PROPERTIES OBTAINED FROM MOLECULAR ORBITAL THEORY

M.A. SCHROEDER, U.S. Army, Ballistic Research Lab., *Aberdeen Proving Ground, Maryland* 21005

This project consists of semiempirical (CNDO/2. INDO, MINDO/2. VESCF-CI, etc.) molecular orbital calculations on propellants, explosives and related compounds.

Details of calculated electronic structures, reactant-product energy differences and energy distributions will be compared with trends in ballistic properties such as sensitivity and thermal stability.

Supporting agency address information: AMC Ballistic Research Labs, Aberdeen Proving Ground, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

3.0028, MICROSCOPIC MODEL OF IGNITION ENERGY TRANSFER IN CRYSTALS
D.F. STRENZWILK, U.S. Army, Research & Development Center, *Aberdeen Proving Ground, Maryland* 21005

To devlop a theoretical model for an energy transfer mechanism as related to the ignition phenomenon. Such a model will include the influence of defects and impurities on ignition and will be initially concerned with simple systems of known crystal structure. This task will be directed at understanding how lattice energy can be absorbed into molecular vibrations both in a perfect crystal, and near or at the defect until bond breakage occurs. Such information should shed some light on the basic chemical steps that take place in the ignition of solid phase compounds.

An effort will be made to adapt standard lattice dynamical technique to the study of energy transfer in the ignition phenomenon. We plan to extend our model of absorption of ultrasonic energy in molecular crystals to three dimensions, as well as the study of the dissociation of a molecule in a lattice in order to better understand how a chemical reaction in an explosive or propellant can occur. Our task will be closely connected with other work in the ignition program, which is directed at obtaining lattice and molecular force constants.

Supporting agency address information: AMC Aberdeen R&D Center, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

3.0029, RADICAL MECHANISMS IN IGNITION OF PROPELLANTS
K.J. WHITE, U.S. Army, Ballistic Research Lab., *Aberdeen Proving Ground, Maryland* 21005

One of the theories related to ignition of propellants stresses the importance of solid phase reactions as the most important energy release mechanism in the ignition phenomenon. The objective of this task is to construct a system which will allow the study of initiation of propellants by thermal pulses. Radicals produced by these mechanisms will be detected and analyzed by electron spin resonance (ESR). It is hoped that within the first year some work will have been completed on the initiation of ammonium perchlorate, potassium nitrate and some nitro compounds such as dinitrotoluene, picric acid and nitromethane. The work will be performed at BRL.

To shed some light on the chemical mechanisms in combustion we propose to explore the ignition mechanism by use of spin resonance (ESR) techniques. The production and observation of free radicals by thermal techniques is not a simple matter. Radicals have been produced readily by high energy radiation. Here heating effects are negligible and the crystalline lattice of the compound can act as a trap for the radicals. However, in the heating process of pyrolysis these crystalline fields are broken and the radical is free to migrate and react. Thus we propose to irradiate single crystals held at low temperature with various heating sources in the hope of initiating reaction without a complete breakdown of the crystalline fields. We will also employ other techniques such as photosensitization of the compound. The crystal will be doped with compounds that will enhance the energy transfer mechanism from optical radiation to thermal effects. The chief advantage in using ESR is that the reaction need only proceed a very small amount (0.0001 percent) in order to produce enough radicals for observation. The ESR technique also allows observation of the reaction in the solid state.

Supporting agency address information: AMC Ballistic Research Labs, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

3.0030, LITHIUM ALLOY ANODES FOR HIGH ENERGY DENSITY BATTERIES IN MISSILES AND TORPEDOES
J.H. AMBRUS, U.S. Navy, Chemistry Research Department, *Silver Spring, Maryland* 20910

To characterize promising lithium alloy anodes with respect to their energy and power densities under conditions applicable to high energy density batteries.

Voltage-time curves will be obtained as a function of current density, alloy composition and temperature (350-700 degrees C) in LiCl- KCl melts using a three electrode system. Supporting chemical and physical data will be obtained as necessary to fully characterize the alloys as electrochemical anodes.

Supporting agency address information: Naval Ordnance Laboratory, Code 00, Silver Spring, Md. 20910

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0031, LITHIUM ALLOY ANODES FOR NONAQUEOUS SOLVENT BASED ELECTROCHEMICAL CELLS
J.H. AMBRUS, U.S. Navy, Chemistry Research Department, *Silver Spring, Maryland* 20910

To determine the conditions, such as temperature, discharge rates, composition, etc., under which given alloys of lithium would perform better than the pure metal in a lithium anode battery. The goal is to preserve the high energy density of lithium anodes, while gaining (1) ease of manufacture (dry room rather than glove box fabrication), (2) lower cost, and (3) safety in fabrication, storage, use, and disposal.

The effect of alloy composition on the chemical and electrochemical behavior of lithium alloy anodes in voltaic cells will be determined. The anodes will be used in conjunction with the best of nonaqueous polar solvent-electrolyte systems found to date. The anodes will be characterized in these systems by determining open circuit voltage, coulombic efficiency, limiting current density, polarization, and degrading side reactions (corrosion) as a function of current density and temperature.

Supporting agency address information: Naval Ordnance Systems Command, Department of the Navy (ORD0333), Washington, D.C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0032, EVALUATION OF BINDERS FOR PROPELLANTS
D.M. FRENCH, U.S. Navy, Propellant Science Department, *Silver Spring, Maryland* 20910

Improve reliability and service life of Navy rocket propellant systems by establishing relationships between chemical structure of polymers and performance of solid propellants employing these polymers as binders. Develop meaningful specifications to enable competitive procurement of propellant binders and reduction in Navy costs.

The approach includes determination of the chemical structure of selected polymers, development and standardization of new analytical techniques to determine such parameters as molecular weight distribution and functionality, a variation in the values of these parameters to determine the effect upon the properties of solid propellant using these polymers as binders, development of statistical correlations between binder characteristics and propellant properties and development of specifications based on these studies for procurement of polymers.

Supporting agency address information: Naval Ordnance Systems Command, ORD-0331B, Washington 25, D.C. 20376

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0033, WEAPONRY - FAST-REACTION KINETICS RELEVANT TO CHEMICAL ROCKET PROPULSION
D.I. MCLEAN, Boston College, School of Arts, *Chestnut Hill, Massachusetts* 02167 (N00014-69-A-0453)

The objective of this work is to gather a wide base of chemical kinetic information of the reactions occurring between simple compounds from two or more of the elements C, H, N, O, F, and Cl. This knowledge, when developed within the temperature, pressure, and concentration regimes obtaining in chemical propulsion systems, will support chemical rocket technology broadly, and it will strongly support Navy chemical rocket developments which are based on using noncryogenic fuels in volume limited missile designs.

Fast reactions will be initiated between selected compounds of C, H, N, O, F, Cl, by electrical discharges in flows, by flames and in shock tubes. Reaction products will be identified and followed on a time resolved basis by mass spectrometry, optical absorption spectrometry, and electron spin resonance spectrometry as appropriate. This will permit identification of transient species, ions and neutrals so that valid mechanisms and rates can be deduced from the data. The contractor has state of the art instrumentation and should be able to obtain significant results. Typical systems of relevance to Navy rocket propulsion developments to

be studied include nitrogen tetroxide- hydrazine, chlorine trifluoride-mixed hydrazine, and perchloryl fluoride-monomethyl hydrazine.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0034, DEVELOPMENT OF COLUMBIUM HIGH TEMPERATURE ALLOYS FOR ARMY APPLICATIONS

E.P. ABRAHAMSON, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

To develop columbium-base alloys for applications in the turbine section of advanced gas turbine engines and the STAGG Development Program. These alloys are specifically intended for use over the 2000- 2500 degrees F range and, depending on the component, without internal cooling. They are being developed as an alternative to the elaborate cooling schemes necessary for nickel-base alloys. At 2500 degrees F, gas temperature, many of the conventional nickel alloys would therefore not only improve engine efficiency but would also remove the risk of local melting. This program supports problem area 15.1, Development of Alloy Systems for Turbine Applications of the Materials Technology Guidance for Aircraft, FY75.

This project will develop and/or evaluate cast columbium (10-17 w/o) tungsten, (3-8 w/o) hafnium, (0-.1 w/o) carbon alloys with respect to low temperature tensile ductility and high temperature tensile strength. Thermal processing will be employed for improvement of properties through control of morphology and distribution of secondary phases. Residual mechanical properties of the optimized alloys will be determined following coating for oxidation resistance and exposure to service conditions.

Supporting agency address information: AMC Materials & Mechanics Research Center, Watertown, Mass. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0035, X-RAY AND OPTICAL CHARACTERIZATION OF CERAMIC MATERIALS IN ARMY SYSTEMS

C.P. GAZZARA, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

To develop advanced methods and techniques for the x-ray and optical characterization of the crystal structure and microstructure of ceramic materials with application to Army systems. To utilize these methods and techniques to optimize the processing procedures and/or the service performance and establish engineering limits of materials (i.e., sapphire) for optical IR laser windows, and structural use (Si3N4).

The spatial and vibrational behavior of electrons in ceramic materials (i.e., sapphire) will be studied with respect to infrared transmission and bonding. A high energy x-ray diffraction technique (equivalent to 90 KeV), will be utilized, for this study, to minimize extinction effects. The dislocation densities of sapphire will be measured by an x-ray extinction technique and correlated with processing parameters. An automatic single crystal diffractometer and optical means will be employed to determine crystal structure and impurity distribution to optimize growth conditions and service properties in sapphire and YAG single crystals. X-ray diffraction powder techniques will be developed for characterizing ceramics (i.e. silicon nitride) for preferred orientation, phase analysis, etc.

Supporting agency address information: AMC Materials & Mechanics Research Center, Watertown, Mass. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0036, ARMOR MATERIALS FORMING PROCESSES

G.M. HARRIS, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

The major problem to be addressed in this project will be the development of armor for defect of high mass fragments, 14.5 and 20mm projectiles. The emphasis will be to develop new or improved methods of ceramic processing technology, or modified materials to meet the above pacing problem. The effect of composition and processing parameters on physical and/or mechanical properties of the materials will be an integral part of material optimization. Sufficient subtask flexibility will be maintained to permit a shift to short-term, high priority items as the need arises and to act as a consultant to other commodity commands and agencies or government contractors.

The major task of this project will be material and process development of ceramic armor for personnel, aircraft and armored vehicle usage. The materials under investigation will be alumina, silicon carbide and modified boron carbide. Infiltrants other than silicon will be investigated for the purpose of lowering processing temperatures and reducing costs. Process development will be directed at improvement of homogeneity, elimination of internal flaws and fabrication of contoured pieces.

Supporting agency address information: AMC Materials & Mechanics Research Center, Watertown, Mass. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0037, EFFECTS AND APPLICATIONS OF TEXTURED TITANIUM

A. ZARKADES, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

Since titanium sheet for the heavy-lift helicopter (HLH) has failed to meet fatigue life design limits for the rotor blade, it is the objective of this program to further establish that controlled crystallographic anisotropy can substantially improve fatigue and other properties of titanium and thereby meet future critical design requirements. Proper selection, control and utilization of textured titanium would allow increased structural efficiency because present design allowables reflect low material properties which are obtained in titanium when texturing is not considered.

Two titanium alloys with different textures will be examined. These include the Ti-6Al-4V alloy, being extensively utilized in present Army components and scheduled for use in future hardware including the heavy-lift helicopter (HLH), and the Ti-4Al-4V composition. Fretting and impact specimens from the 4Al-4V titanium alloy will be tested in the rw, wr, rt and wt orientations. Characterization of the smooth fatigue life will be conducted for the titanium 6Al-4V composition with an (ideal) preferred orientation. All tests will be conducted at room temperature.

Supporting agency address information: AMC Materials & Mechanics Research Center, Watertown, Mass. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0038, MOLECULAR BEAM METHODS OF EVALUATING HIGH ENERGY SOURCES FOR ADVANCED PROPULSION SYSTEMS

E.W. ROTHE, Wayne State University, School of Engineering, *Detroit, Michigan* 48202 (AF-AFOSR-1799-69)

Improved performance in propulsion systems is based on the knowledge and complete understanding of many complex interrelated processes. The study of the combustion process, the species involved and an evaluation of possible high energy compounds is of obvious importance. An objective of this research is to study several molecules with high chemical energy content. Molecular beam experiments have become one of the best ways to study molecular dynamics in chemical reactions. Some of the many advantages of using molecular beam experiments are - (a) selection of specified energy states, both internal and translational, (b) restriction of reactive encounters to single collisions which are not altered by subsequent collisions, (c) characterizations of the energy states of the products, (d) direct location of the energy threshold for chemical reactions. In this research cesium atoms of precisely known energy will collide with the molecules to be evaluated. The energy threshold for ionization and molecular energies in the target (i.e., electron affinities and bond strengths) will be determined from the experiments.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0039, RATES AND MECHANISMS OF REACTIONS OF FLUORINE-CONTAINING ROCKET PROPELLANTS

T. HOUSER, Western Michigan University, Graduate School, *Kalamazoo, Michigan* 49001 (AF-AFOSR-2160-72)

Better performance is always one of the goals in which designers seek to incorporate in future weapons delivery systems and space boosters. One way to obtain higher performance is through the use of new power plants which utilize high energy-containing chemical compounds. This research effort studies the rates and mechanisms of reactions of some of these high energy compounds, particularly those containing fluorine, e.g. oxygen difluoride and hydrazine tetrafluoride. The objective of the program is to obtain information concerning the stability and chemical properties of these species. This information is of value for the following reasons - (a) these radicals are of prime importance as functional groups in the formation of new high energy oxidizers, thus a knowledge of their chemical properties will be of value in understanding the properties of these oxidizers, and (b) these radicals are involved in the reactions which occur after mixing of fuel and oxidizer but before the ignition of certain propellant systems, thus a knowledge of their chemical properties will provide fundamental information concerning these preignition reactions.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0040, FUNDAMENTAL MECHANISM OF LAMINATE COMPOSITE FAILURE 12082-RTL

E. WU, Washington University, School of Engineering, *St. Louis, Missouri* 63130 (DAHC04-74-G-0055)

To explore both theoretically and experimentally the fundamental mechanism of laminated composites toward the goal of closing the gap between analysis and experimental facts. Results originating from this research will be useful to designers of composite materials, such as those employed in Army aircraft, armor, and rocket launchers.

Load-deformation behavior will be analyzed using initially the strength of materials approach followed by a more vigorous analysis using methods of linear elasticity. The composite to be explored is glass-epoxy.

Supporting agency address information: OCRD Army Research Office, Box CM, Duke Station, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0041, OXIDATION KINETICS OF HYDROCARBON FUELS

I. GLASSMAN, Princeton University, School of Engineering, *Princeton, New Jersey* 08540 (AF-AFOSR-2604-74)

In support of research objective 5.1 (rocket propulsion) and 5.2 (air-breathing propulsion), and 6.3 (chemical lasers), this research effort will be concerned with fundamental studies to improve performance and reduce emission characteristics of air-breathing propulsion systems, better the understanding of plume problems, and examine fuel constituents for visible lasers. These problem areas have a need for better definition of the coupled fluid mechanical and chemical kinetic processes which occur in these devices. The study will include (1) continuing analytical work using experimental results as a comparative source for developing more detailed kinetic mechanisms for the oxidation reactions of hydrocarbons, (2) continuing detailed experimental studies on the ethene-oxygen and propane-oxygen systems, (3) obtaining overall experimental data on higher order paraffin hydrocarbons such as hexane, octane, etc., (4) pointing out the application of this effort and its results to AF problems associated with air-breathing engine performance, plume characteristics, and engine emission properties and (5) consideration and examination of the understanding of metal vapor oxidation processes of interest in chemical lasers.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0042, THE STABILITY, ELECTRONIC AND SURFACE PROPERTIES OF THE ALKALI AZIDES 11330-C

B.S. ROYCE, Princeton University, School of Engineering, *Princeton, New Jersey* 08540 (DAHC04-73-C-0019)

To determine the factors related to the decomposition of metal azides. Relevance- this research should provide needed fundamental information on a class of metastable materials which are important to the Army in such areas as explosives, pyrotechnic ingredients, and propellant composition components.

Fundamental electronic and lattice properties that are related to the decomposition of metal azides will be studied. In particular, the research will be concerned with measurements of the properties of holes and electrons in single crystals of Kn3 and with a study of the surfaces of these crystals as related to the decomposition processes.

Supporting agency address information: US Army Research Office, Box CM, Duke Station, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0043, ORGANOMETALLIC COMPOUNDS 11300-C

T.J. KATZ, Columbia University, School of Arts, *New York, New York* 10027 (DA-ARO(D)-31-124-73-G122)

To synthesize a series of non-aromatic, metal containing polymers and to determine their physical and chemical properties. The proposed study could lead to novel organometallic compounds and polymers potentially useful to the Army. These new compounds may impart thermal stability of flame retardancy, may have useful electrical properties, e.g. semiconductance, and be as useful as burning rate modifiers for propellants.

The reaction of a transition metal halide with a hydrocarbon dianion made up of two linked cyclopentadienyl anions is anticipated to give a polymeric metallocene in which hydrocarbon rings and metal atoms alternate.

Supporting agency address information: US Army Research Office, Box C, Duke Station, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0044, MATERIALS SUPPORT - ELECTRIC FIELD CONTROLLED TRANSITIONS IN TRANSITION METAL COMPOUNDS

D.C. MATTIS, Yeshiva University, School of Science, *New York, New York* 10033 (N00014-69-A-0411)

The Navy has need for new circuitry materials for fast switching needs. Transition metal compounds and solid solutions which may exhibit metal-insulator nondisruptive transitions near room temperature and which are also ferroelectrics offer potential for electric field control of switching (fast), rather than slow thermal transitions. This work focusses on control of electrical, magnetic and optical behavior of carefully prepared metal chalcogenide and oxide solids in order to provide new candidates for device needs.

Crystallographic and electrical properties of ferrous sulfides (pure and doped with Cr, Mn) are being determined. Niobium dioxide will be characterized as to crystallographic features and the nature of the semiconductor-metal transition. Materials characterized will be pulsed to determine if transitions occur. Electron-phonon interactions in solids will be studied via raman scattering. Theoretical work on electron-lattice interactions and phase transitions continues.

Supporting agency address information: Office of Naval Research 471, Washington, D.C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0045, MATERIAL DUCTILITY VERSUS RELIABILITY OF NAVAL AIRCRAFT STRUCTURES

V. WEISS, Syracuse University, Research Institute, *Syracuse, New York* 13210 (N00019-72-C-0214)

To develop a design system incorporating critical fracture and ductility parameters for peak performance of naval structural components which will allow the prediction of load carrying capacity within specifiable statistical limits.

Determine the local fracture parameters (Klc, notch ductility, fracure strain) under varying biaxial stress states for a number of ultra high strength materials with extension to complicated geometries and loading conditions, with the aim of design approach formulation capable of determining load carrying capacities of structural conditions.

Supporting agency address information: Naval Air Systems Command 52031E, Washington, D.C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0046, NAVY VEHICLE DESIGN AND CONSTRUCTION - INVESTIGATION OF ALLOY SEGREGATION IN ALUMINUM ALLOYS USED FOR NAVAL AIRCRAFT
G. JUDD, Rensselaer Polytechnic Inst., School of Engineering, *Troy, New York* 12181 (N00014-67-A-0117-0009)

In many aluminum alloys used in naval aircraft, segregation of alloying elements can occur during the heat treatments used to develop high strength levels. Such segregation can lead to problems such as low ductility or stress corrosion cracking under certain stress and environmental conditions. The objective of this research is to study segregation in various aluminum alloys in order to determine methods of controlling it and to eliminate its harmful features.

Alloy segregation in aluminum alloys based on the Al-Mg-Zn system is to be studied by means of electron microprobe analysis. Substructural features are to be assessed by means of transmission electron microscopy. Aging characteristics, segregation and structure resulting from various heat treatments and additions of trace elements will be determined. The relationship between structure, mechanical properties and stress corrosion resistance will be made using current mechanical testing methods.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0047, NUCLEAR MAGNETIC RESONANCE STUDIES AND CYANOBORANE CHEMISTRY 11461-C
A. MCPHAIL, Duke University, School of Arts, *Durham, North Carolina* 27706 (DA-ARO(D)-31-124-73-G90)

A study of the relationships between (13)C and (11)B chemical shifts will be carried out and extended to other NMR active nuclei. In synthetic work, macrocyclic and polymeric forms of cyanoborane will be isolated and studied. Nuclear magnetic resonance is one of the most powerful techniques available for structure elucidation of compounds and materials. The study should increase the effectiveness and applicability of NMR to the study of a vast variety of compounds and materials of interest to the Army, in particular, potential high-energy compounds containing any of the elements C, N, B. Used as fuels, oxidizers, explosives, and combustion modifiers, these would be related to pa interest in NMR studies of nitramines and related materials.

Linear correlations observed between (11)B and (13)C chemical shifts in tricoordinate and tetracoordinate isoelectronic boron and carbon compounds will be expanded to include a very wide variety of substituent groups. Linear correlations or their absence will be established between (13)C and (11)B resonant nuclei and other resonant nuclei such as (29)Si, (119)Sn, (79)Ge, etc. In tetracoordinate compounds) in synthetic work, the macrocyclic cyanoboranes, (BH2CN)n, will be separated by glc and x-ray crystal studies carried out. The chemistry of the cyanoboranes will be explored especially the reactions with transition metal carbonyls.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0048, MATERIALS SUPPORT TECHNOLOGY - IMPROVED CERAMICS FOR STRUCTURAL APPLICATIONS (IMPACT RESISTANCE)
A.H. HEUER, Case Western Reserve Univ., School of Engineering, *Cleveland, Ohio* 44106 (N00014-67-A-0404-0003)

The Navy has need for stronger, tougher ceramic materials for such components as radomes, ir domes, turbine components and reentry needs. Marked increases in strength, hardness and fracture toughness would lead to improved impact and erosion resistance of these materials. Basic factors necessary for ceramic alloy development, such as precipitation kinetics, aging conditions, and microstructural morphologies have been determined and are now being related to impact resistance.

Spinel single crystals of various compositions and degrees of non- stoichiometry which have been precipitation-hardened are being studied. The microhardness of crystals containing various precipitate structures will be studied. Particular emphasis will be on the effect of precipitate-dislocation interactions. Fracture mechanics studies of the environmental influences of slow crack growth will be continued in these materials. The double torsion and hertzian cone fracture tests will be used to study crack propagation.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0049, DEVELOPMENT OF ALLOY DESIGN APPROACHES FOR COMPOSITE STRUCTURES 11132 MC
E. RUDY, Oregon Grad. Ctr. Stu. & Res., *Beaverton, Oregon* 97005 (DA-ARO(D)-31-124-73-G85)

To develop explicit thermodynamic approaches for the calculation of ranges of phase stability and compatibility, and of partition equilibria in systems containing up to five components. This investigation of the thermal and compositional stability of complex alloys is relevant to the design of new alloy systems and to their processing and performance at high temperatures. Components for rocket nozzles, heat shields, and turbine parts are examples of military materiel affected by this investigation. The materials selected for the proposed study possess desirable strength, modulus of elasticity, hardness, and wear resistance. Cutting tools, armor, projectiles, composites, and powder metallurgy dies are examples of Army hardware wherein these materials are being utilized. A knowledge of the ranges of thermal and compositional phase stability in complex systems could lead to a large reduction in time and expense in the development of new, complex materials necessary to meet increasing Army needs.

The program will include, but will not be limited to the following topics: (1) extension of the thermodynamic methods developed for three- component systems to systems having up to five components; (2) establishment of explicit equations to calculate partition equilibria between phase solutions with fixed stoichiometry with respect to one of the components; (3) experimental verification of the calculated ranges of stability with respect to pressure, temperature and composition of five-component (metal-metal-metal-carbon-nitrogen) systems; (4) design of composite materials which are hard, and fine-grained using the principles developed.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0050, EFFECT OF SURFACE CONDITION ON MECHANISMS OF THERMAL STRESS FRACTURE OF STRUCTURAL CERAMICS 10722-MC
P.H. HASSELMAN, Lehigh University, School of Engineering, *Bethlehem, Pennsylvania* 18015 (DA-ARO(D)-31-124-73-G45)

To develop a fundamental understanding of the effects of surface condition of structural ceramics on the mechanisms of fracture resulting from thermal stress. The Army has great interest in the thermal shock resistance of ceramics. Ceramic materials used in rocket radomes and nozzles are also subject to thermal cycles which cause shock and failure. Even ceramic components used in electronic devices are subject to thermal stresses during warmup and shutdown.

The program will include, but will not be limited to, the following topics: (1) experimental study of the effects of humidity, cracks, and residual stress at the outer surface on the modulus of rupture of ceramic materials subjected to severe thermal shock; (2) theoretical analysis of the interaction of cracks with nonuniform thermal and residual stress gradients, to include the effects of stress relaxation on the characteristics of propagation of cracks.

Supporting agency address information: AMC Army Research Office ARO-D, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0051, STRESS WAVE PROPAGATION IN PARTICULATE COMPOSITE MATERIALS
A. WANG, Drexel University, School of Engineering, *Philadelphia, Pennsylvania* 19104 (DAAD05-73-C-0251)

The main objective is to obtain experimental data for transient wave propagation in particle filled composite propellants, determining the attenuation, the phase change and the phase velocity due to viscoelastic effects, and determining the same parameters due to wave scattering.

Ultrasonic techniques, some using the water bath technique, will be employed to examine stress wave propagation in propellant binders and in filled inert propellant. A parallel analytical approach will be used to generate a model to couple the test cases.

Supporting agency address information: AMC Ballistic Research Labs, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

3.0052, SPECTROSCOPIC STUDIES OF HIGH ENERGY MATERIALS
R.W. ANDERSON, U.S. Army, Pitman Dunn Research Labs., *Philadelphia, Pennsylvania* 19137

To study the molecular properties of exicted electronic states of high energy molecules used as propellants or propellant additives.

A high power, mode locked laser apparatus will be used to provide excitation energy in times which are short compared to the dissociation process. Also, the high powers available from these lasers will enable multiphoton excitation to energies not conventionally accessable.

Supporting agency address information: ARMCOM Pitman Dunn Research Labs, Frankford AR, Pa. 19137

SUPPORTED BY U.S. Dept. of Defense - Army

3.0053, DRY SURFACE LUBRICATION
H. GISSER, U.S. Army, Pitman Dunn Research Labs., *Philadelphia, Pennsylvania* 19137

To prepare and study chemically modified (metal) surfaces of inherently low friction and wear properties, and to study graphite fluoride in polymer matrices as a solid lubricant.

Two approaches are being investigated, i.e., chemically modified surfaces and solid lubricating films. Surfaces are being modified by diffusion of other metals into the basis metal, followed by chemical treatment to convert the diffused layer into a compound requiring no further lubrication. Typical of this approach is the diffusion of silver, copper or molybdenum into a substrate metal with subsequent conversion of the diffused metal to its sulfide. Solid lubricating materials such as graphite fluoride, LP alloys (Mo, Co, Si-tribaloy) and 60:40 copper-lead composites will be studied in high temperature polymer binders, e.g., poly-methylphenyl silicone, polyimide and polybenzimidazole. Wear and friction characteristics will be studied from room temperature to approximately 300 degrees C on a pin-on-disk apparatus and on a Falex apparatus.

Supporting agency address information: MUCOM Pitman Dunn Labs, Frankford AR, Pa. 19137

SUPPORTED BY U.S. Dept. of Defense - Army

3.0054, THE PREPARATION OF INORGANIC COATINGS ON STRUCTURAL AND OTHER MATERIALS BY THE ANODIC SPARK REACTION PROCESS
L.L. GRUSS, U.S. Army, Pitman Dunn Research Labs., *Philadelphia, Pennsylvania* 19137

To investigate the factors which control the deposition of anodic coatings on rare earth metals and alloys, such as current density, temperature, formation voltage and electrolyte concentration for liquid and gas phase anodization systems. This research is directed toward the development of technical information regarding ceramic processing and products which will provide the knowledge for the development of such new improved ceramic protective coatings.

Rare earth oxides, aluminates and silicates can be prepared in the form of films and coatings by anodic spark reactions of the rare earth metals. These materials are forms of spinels (ABO_3, $A_3B_5O_{12}$ type) which are high melting materials and as ceramic coatings they can offer erosion and corrosion protection to metals in high temperature surroundings. Erbium and ytterbium metals will be vapor deposited onto glass slides by multiple source metal evaporation. Subsequently, oxide films will be obtained on the pure metals and their alloys by anodic oxidation in sodium hydroxide solutions and by vapor phase anodization. In addition, the rare earth metals in rod form will also be anodized in sodium hydroxide, sodium aluminate, sodium silicate and sodium vanadate solutions.

Supporting agency address information: ARMCOM Pitman Dunn Research Labs, Frankford AR, Pa. 19137

SUPPORTED BY U.S. Dept. of Defense - Army

3.0055, RAPID SCAN RAMAN AND INFRARED STUDIES OF PROPELLANT IGNITION
J.A. LANNON, U.S. Army, Pitman Dunn Research Labs., *Philadelphia, Pennsylvania* 19137

To investigate the kinetics of burning propellants in the gas and solid phases. The purpose will be to identify molecular species and fragments produced during the ignition of propellant compositions in order to enhance our knowledge in understanding the mechanism of ignition.

The kinetics of ignition in the gas phase and solid phases will be studied using rapid scan infrared and raman techniques. The rapid scan infrared will enable us to scan a spectral range of 1000 cm-1 in the 4000 -665 cm-1 region in 10 microseconds and repeat the scan every fifty microseconds. The raman spectrometer will allow the recording of spectra in microsecond time frames.

Supporting agency address information: ARMCOM Pitman Dunn Research Labs, Frankford AR, Pa. 19137

SUPPORTED BY U.S. Dept. of Defense - Army

3.0056, ORGANOMETALLIC COMBUSTION CATALYSTS
W.R. PETERSON, U.S. Army, Pitman Dunn Research Labs., *Philadelphia, Pennsylvania* 19137

To characterize the effects of ferrocene derivatives and their molecular complexes with inorganic nitrates, on the burning rate of gun propellants- to obtain a correlation between molecular structure and behavior as burning rate accelerators, to serve as a guide in the synthesis of improved combustion catalysts.

Materials for study include those that are high energy per se, serving as combustion catalyst, and behaving as propellant material at the same time, and those that serve only as passive or inert catalysts. Molecules are structured according to discernible trends towards improved burning of nitrocellulose propellants without impairment of heat stability.

Supporting agency address information: ARMCOM Pitman Dunn Research Labs, Philadelphia, Pa.

SUPPORTED BY U.S. Dept. of Defense - Army

3.0057, WORKABILITY OF TUNGSTEN - BASE HEAVY ALLOYS
F.E. SCZERZENIE, U.S. Army, Pitman Dunn Research Labs., *Philadelphia, Pennsylvania* 19137

The objective of this work is to investigate the cold working behavior of tungsten base heavy alloys into various shapes for selected sub-munitions. This work supports solution of pacing materials problems for hard target penetration in the area of armaments.

The processing of tungsten heavy alloys into relatively simple shapes by p/m techniques is fairly well known. However, the processing of shapes by subsequent working is not presently a part of industrial technology. Further, very little published data exists on the workability of these alloys. Based on past in-house work, tungsten- nickel-iron system offers the best potential for producing workable tungsten heavy alloys as compared to the more common tungsten-nickel- copper alloys. Elongations over 20 percent can be readily attained in the 90W-5Ni-5Fe alloy with tensile strengths up to about 140 ksi. Work during FY74 will be concerned with defining the mechanisms of deformation and failure in these alloys. Based on this information alloys with maximum formability will be developed. The tungsten content in these al-

loys will range between 75 and 90 percent with the remainder being a nickel-iron matrix. The processing conditions will be optimized to provide alloys will be optimized to provide alloys with maximum densification and tensile elongation. The working experiments on these alloys will involve rolling, bending and cupping of suitable shapes with major emphasis on the forming of cup and hemispherical shapes. Such forming variables as thickness and diameter of blank- clamping forces to prevent folding, wrinkling or tearing of compact will also be determined. Alloys showing the best formability will be fabricated into special shapes for ballistic evaluations.

Supporting agency address information: ARMCOM Pitman Dunn Research Labs, Frankford AR, Pa. 19137

SUPPORTED BY U.S. Dept. of Defense - Army

3.0058, NAVY VEHICLE DESIGN & CONSTRUCTION - CONTROLLING SOLIDIFICATION VARIABLES TO DEVELOP DESIRED MICROSTRUCTURES & PROPERTIES (ABBREV)

H.D. BRODY, Univ. of Pittsburgh, School of Engineering, *Pittsburgh, Pennsylvania* 15213 (N00014-67-A-0402-0003)

Many naval components are used in cast form. Mechanical properties of castings are directly related to the cast structure and alloy segregation that can occur during solidification. This research effort is aimed at improving properties of castings by controlling the important variables affecting solidification structure.

Several facets of solidification are under investigation here. Factors leading to solute microsegregation will be found for ternary alloys. Macrosegregation resulting from density differences between solidifying phases will be examined. The process of directional solidification of eutectic composites will be studied to determine optimum structures for best creep properties in the Nb-C system.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0059, RESEARCH FOR ESTABLISHING NDT TECHNIQUES FOR METAL MATRIX AND RESIN MATRIX COMPOSITES

J.F. ERTHAL, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974

To quantitatively assess the material-energy interactions that can be employed to nondestructively determine the suitability and reliability of advanced materials and processes for resin and metal matrix composites utilized in aircraft structures.

Investigate techniques for the nondestructive evaluation of mechanical properties and structural integrity for advanced composite materials. Composite systems to be studied include B/Al, Be/Al, Be/Ti, graphite/epoxy, and boron-graphite-glass. Techniques under consideration include acoustic emission, thermal conductivity and acoustic signature analysis.

Supporting agency address information: Naval Air Systems Command 320, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0060, STRENGTH AND FAILURE CRITERIA FOR COMPOSITE AERO STRUCTURES

S.L. HAUNG, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974

To provide understanding of failure mechanisms in fiber reinforced composite laminates. To identify the fundamental physics of the numerous interdependent, composite failure mechanisms. To formulate rational failure criteria based upon predominate interacting failure modes appropriate to various critical loading conditions. To develop analytical procedures, based upon these failure criteria, to predict critical strengths of composite structures.

Apply background knowledge and analytical and mathematical skills to the development of new strength and failure theories for advanced filament reinforced composite materials. These theories will be based upon the fundamental physics of composite failure mechanisms. Analytical continuum and fracture mechanics procedures will be applied to phenomenologically explain and numerically quantitize the various failure mechanisms. Experiments will be designed in light of the developed theory to elucidate and demonstrate the various failure phenomena.

Supporting agency address information: Naval Air Systems Command 320B, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0061, ADVANCED MATERIALS FOR REDUCTION OF AIRCRAFT MAINTENANCE COST AND MANPOWER

S.J. KETCHAM, U.S. Navy, Air Development Center, *Warminster, Pennsylvania* 18974

This work is intended to decrease the cost and amount of labor required in keeping aircraft in service as a result of damage caused by corrosion. This cost is high in dollar and man-hours, and the development of materials and methods to improve stripping, cleaning, lubrication, heat treatments, as well as removal of corrosion damage and refinishing with more durable protective coatings will yield substantial savings in decreased maintenance costs.

Optimum corrosion protection systems for fastener and faying surface areas under both static and dynamic conditions are being developed. Inorganic coatings to prevent fretting corrosion of titanium are being studies. Existing materials will be evaluated and new materials developed as required. Testing methods to more adequately characterize performance capabilities of high temperature greases for high speed roller bearings are being developed. A paint remover that will selectively remove topcoat without removing the epoxy primer and a rain erosion coating without carcinogens are also being developed. Procedures and limitations of glycol quenching of complex machined parts of high strength aluminum alloys will be established.

Supporting agency address information: Naval Air Systems Command 320A, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0062, PREPARATION OF OIL SOLUBLE CORROSION INHIBITING SALTS FOR AIRCRAFT FLUID SYSTEMS

J. OHR, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974

To improve the corrosion inhibition effectiveness of diverse organic-based materials by incorporating effective passivator-type chromate salts in an oil soluble form. The chromate anions in these material systems may well have an inhibitive effectiveness even beyond that to be expected from their proven performance in aqueous solutions, since in the former instances the anion would not be encumbered by a solvation shell.

A few macrocyclic polyethers will be synthesized. Attempts will be made to complex these with chromate salts. If successful, and the anion solubility in non-polar solvents exceeds the critical concentrations required for corrosion protection, then the salts will be added to the material systems and the improvement in corrosion protection determined. If efforts along these directions appear promising but improved anion solubility is required, a new class of complexation macrocycles would be prepared which would be more specific for the passivator salts.

Supporting agency address information: Naval Air Development Center 01, Warminster, Pa. 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0063, RESEARCH IN CHARACTERIZATION TECHNIQUES FOR ORGANIC MATERIALS

E.R. WRIGHT, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974

To devise methods for characterizing aircraft airframe organic materials such that they can be reproduced by duplicating a defined composition and structure and, additionally, to advance the capability for employing these methods for determining changes and mechanisms associated with any environmental deterioration of organic materials.

Characterization of materials ideally involves identification of all chemical constituents and determination of their concentra-

tion, electronic state, state of combination, location and distribution throughout a sample. An approach which may prove fruitful will be a solid state study with the appropriate instrumentation (ESR, NMR, UV, etc.) of the fundamental degradation processes in organic coatings during exposure conditions. As required, it may be necessary to modify the above techniques or establish new procedures in order to accomodate the need of a particular material and achieve the desired characterization.

Supporting agency address information: Naval Air Systems Command 320, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0064, COMBUSTION AND FLAME PROPAGATION IN HETEROGENEOUS SYSTEMS

A. CRESPO, Inst. Nac. De Tec. Aerospacial, *Madrid, Spain* (AF-AFOSR-2253-72)

This research supports RO 5.1.5 in its study of monopropellant behavior. In liquid rocket propellant missiles, the operating pressures and temperature in the combustion chamber are above the critical ones corresponding to the fuel that is injected. The process of droplet vaporization and combustion under these conditions is of primary importance to know the performance of the motor. Our objective is to study how the droplets are being heated, vaporized, and burned when they approach their thermodynamic critical point. The problem of catalyst degradation in the hydrazine thrusters used in satellites is of great importance. This may be related to the starting characteristics of the thruster. The processes of hydrazine penetration, decomposition and expulsion in the catalytic particles will be studied. Another modern concept in hydrazine thrusters is that of thermal engines in which hydrazine is decomposed thermally. The process of hydrazine vaporization is of primary importance for the design of these engines. This will be studied considering that the hydrazine is injected in the chamber either in spray or continuous form.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0065, LOW TEMPERATURE FLUORINE CHEMISTRY OF ELECTRONEGATIVE ELEMENTS 10932-C

G. MAMANTOV, Univ. of Tennessee, School of Liberal Arts, *Knoxville, Tennessee* 37916 (DA-ARO(D)-31-124-73-G96)

To provide a low-temperature synthesis and characterization of new species containing fluorine and one or more of the following elements- bromine, iodine, oxygen and nitrogen. This research could lead to new powerful oxidizing agents and fuel oxidizers as well as new selective fluorinating reagents. Fluorine (and halogen) containing materials possess many desirable properties of considerable Army interest such as enhanced resistivity towards chemical and physical degradation. This research could lead to a better understanding of existing materials and to the preparation of new halogen containing materials.

The following synthetic routes will be explored: (a) reactions of fluorine, oxygen, or chlorine atoms with halogens, interhalogens, and chemically related substances in rare gas or nitrogen matrices; (b) photolytic decomposition of the parent molecule trapped in the matrix followed by diffusion of the atoms produced; (c) reactions of electrons, generated by the photoionization of an alkali metal present in the matrix, with electronegative species; (d) the use of the rotating cryostat for studies of matrix reactions of small polyatomic radicals. The products will be characterized in situ by infrared and raman spectroscopy and electron spin resonance.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0066, KINETICS OF OXIDATION REACTIONS

R.R. BALDWIN, Univ. of Hull, *Hull, England, United Kingdom* (AF-AFOSR-2450-73)

This research directly supports research objectives 5.1 and 5.2 in an examination of fundamental kinetic mechanisms inherent in rocket and turbojet combustors, nozzles, and plumes. Specific investigations are being pursued under this grant in an effort to supply definite answers to several of the difficult, controversial questions still remaining in the kinetics of the oxidation and combustion of hydrogen, hydrocarbons and related compounds. The systems under study include hydrogen-oxygen, hydrocarbon-oxygen, hydrogen-oxygen-carbon monoxide, hydrogen-oxygen- nitrous oxide, hydrogen peroxide, and aldehyde-oxygen. All of these systems are interrelated, each providing some precise information which helps the interpretation of the others. Experimental methods include following the slow reaction, and determining the explosion limits, using surfaces found by Professor Baldwin to give accurate and reproducible results. Besides temperature, pressure and concentration variation, important advances are being made by additives, determination of reaction intermediates, using sensitive gas chromatographic, mass spectrometric and other methods, variation of the type and area of the vessel surface, and isotopic substitution.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0067, COMBUSTION TRANSIENTS OF SOLID PROPELLANTS

A.D. BEAR, Univ. of Utah, School of Engineering, *Salt Lake City, Utah* 84112 (AF-AFOSR-2470-73)

This research supports RO 5.1.1 through its relationship to solid propellants in the areas of combustion instability, ignition, and extinguishment. Both acoustic and low-l* instability, are being explored and characterized for conventional and high-energy propellants. An improved theory of nonacoustic instability will be developed and based on data from firings in a low-l* burner and other tests. The objective of the ignition-extinguishment research is to formulate a quantitative description of these processes. Involved is study of the behavior of conventional and high-energy propellants subjected to a known energy input at their surface, including study of ignition times as function of the imposed conditions of heat flux and pressure and as a function of the physical and chemical character of propellants. Critical surface and subsurface reactions are to be kinetically characterized. Combustion- recoil experiments will be performed to determine the feedback-flux, surface-regression relationship for the steady-state and transient- burning cases. Flame stability and low-pressure deflagration limits will be studied and the results interpreted in terms of kinetic transport properties of the combustion zone and their relationship to pressure- decay extinguishment and unstable combustion.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0068, DEVELOPMENT OF MEMORY FUNCTION NORMS FOR SOLID ROCKET PROPELLANTS AND OTHER MATERIALS

J.E. FITZGERALD, Univ. of Utah, School of Engineering, *Salt Lake City, Utah* 84112 (AF-AFOSR-2322-72)

This work is in direct support of research objective 5.1.3, examining the fundamental mechanical properties of solid propellants. A major problem with solid propellants used in a variety of AF weapons is internal damage due to deformation of the propellant grain. To improve shelf life and reliability of solid motors, an accurate assessment of the structural capability of a solid grain requires accurate constitutive laws. The goal of this program will be to conduct theoretical research on characterizing materials with memory. Phenomena such as fading, permanent and increasing type memory effects will be investigated using various viscoelastic materials. While the theoretical work is, of necessity, general in application, special emphasis will be given to solid propellants. In addition, experimental work will be conducted on filled polymers both for the purpose of discovering new coupled thermomechanical effects and to determine specific constitutive coefficients for inclusion into the equations. Algorithms will be developed to permit computer calculations so as to provide an engineering workable method for converting experimental data into numerical representations. A continuing effort will be expended to develop the methodology for including aging effects in the constitutive equations.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0069, KINETICS, ENERGETICS, AND INFRARED LASING IN HIGH ENERGY ROCKET PROPELLANT INGREDIENTS AT CRYOGENIC TEMPERATURES
H.A. MCGEE, Virginia Polytechnic Institute, School of Engineering, *Blacksburg, Virginia* 24061 (AF-AFOSR-2109-71)

Novel synthetic procedures utilizing combined plasma and cryogenic operations to yield high energy propellant ingredients have been explored in an effort to improve the present range, speed, and payload limitations of weapons delivery systems. A number of such compounds, which represent the present day limit of chemical energy storage, have been synthesized and energetically characterized. These same high energy compounds are now to be burned in an especially designed cryogenic optical cavity in a search for new chemical lasers. The past successful syntheses which make available the new high energy cryochemical reagents now make the high intensity and high power efficiency laser objectives possible. After some rather challenging cryochemical and optical engineering, selected reagents will be burned in the optical cavity under a variety of conditions to develop a high intensity device. The chemical laser is a flow reactor which, like any other reactor, needs adaptation of the chemical engineering principles of heat, mass, and momentum transport with simultaneous chemical reaction if it is to be optimized.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0070, WHISKER REINFORCED METALS FOR NAVAL ORDNANCE COMPONENTS AND STRUCTURES
P.J. LARE, Artech Corporation, *Falls Church, Virginia* 22042 (N00017-74-C-4305)

Develop materials capable of meeting the more stringent strength- to-weight ratio and stiffness requirements of future weight and volume limited naval missiles. In particular, determine feasibility and characteristics of reinforcing aluminum alloys with silicon carbide whiskers and carbon fibers, and titanium alloys with boron or borsic filaments.

The systems to be investigated will be: (a) 2024 and 7000 series Al alloys, utilizing chopped carbon filaments and beta SiC whiskers as reinforcements; and (b) Ti-6Al-4V alloy with boron or borsic filaments as reinforcements. Variables of matrix composition, whisker composition, volume fraction, consolidation and fabrication parameters will be investigated. The resultant materials will be evaluated in terms of density, metallographic structure and composite fabrication, which will include liquid-phase hot pressing, melting and mechanical working. Properties at elevated temperatures up to 800 degrees F will be determined as well as corrosion and oxidation resistance, and fatigue endurance limits. Barrier coatings will be applied on the filaments to prevent interaction with the titanium matrix.

Supporting agency address information: Naval Ordnance Systems Command 0333, Washington, D.C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, NEW TECHNIQUE FOR FLUID TEMPERATURE AND VELOCITY MEASUREMENT
F. ROBBEN, Univ. of California, School of Engineering, *Berkeley, California* 94720 (AF-AFOSR-2684-74)

AF flight operations at ever increasing severity of requirements of speed and altitude capabilities entail improving knowledge of the details of complex flow patterns, not only around aircraft external surfaces, but in engine inlets, exhaust nozzles, compressors, turbines, and combustors. The proposed program is to develop a laser Doppler velocity and temperature measuring diagnostic system that requires neither seeding of the flow with solid particles nor the insertion of a flow disturbing probe. A classical piece of optical apparatus, the Fabry-Perot Interferometer, can be used to measure the light scattered from the gas molecules themselves. It thus appears possible to develop practical instruments which will remotely measure temperature and velocity in gases without seeding them. These instruments could have a wide variety of uses, including use in wind tunnels, free flight measurements, and remote ranging measurement of atmospheric temperatures and velocity. Currently available laser Doppler velocimeters, which do depend on seeding, are satisfactory in many respects for velocity measurement, but they have no way to measure temperature simultaneously.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0002, CONTROLS-CONFIGURED SYSTEMS
J.S. MEDITCH, Univ. of California, School of Engineering, *Irvine, California* 92664

A method of designing control systems by simultaneous development of the controller and the plant, subject to realistic constraints, will be studied in this project. Modern control theory is applied for this purpose to both deterministic and stochastic systems. Such an approach, original with this project, is of great value in the areas of chemical engineering, waste treatment, transportation, and aircraft design.

SUPPORTED BY U.S. Natl. Science Foundation

4.0003, SIGNAL PROCESSING WITH MICROPROCESSOR NETS
J. GOLDBERG, Stanford Research Institute, *Menlo Park, California* 94025 (F33615-72-C-2024)

There are three major objectives of this procurement- (1) the determination of the capabilities of microprocessor nets to handle signal processing tasks, (2) the development of preliminary specifications for an elementary microprocessor, (3) the development of specifications for net interconnections and extranet communications.

Signal processing with microprocessor nets can accommodate the high computational speeds and throughput normally attained by dedicated hardware. Hence, the net approach allows the development of fault tolerant signal processing systems through exploitation of the concept of 'functional redundancy'. That is, system reliability can be increased through the capability of redirecting the microprocessor tasks through dynamic programming of the net.

Supporting agency address information: AF Avionics Laboratory AAM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0004, ANALYTICAL METHODS IN THE THEORY OF FLUID MECHANICS, AERODYNAMICS AND ELECTROMAGNETISM
D. GILBARG, Stanford University, Graduate School, *Palo Alto, California* 94305 (F44620-72-C-0031)

In higher flight regimes, the effect of fluid flow over the surface of a vehicle is critical to its performance, although unpredictable using existing methods. For example, no adequate methods now exist for predicting the general aerodynamic characteristics of hypersonic vehicles, nor for predicting the state of the boundary layer in hypersonic flow. As a result, better analytical techniques of fluid mechanics, free surface flow and boundary layer theory must be developed. The development of these mathematical methods is the goal of this program. Select research areas in fluid mechanics, aerodynamics and electromagnetic theory; include the study of free boundary problems, the hydrodynamic forces acting on a body with respect to asymptotic wave behavior, and the resolution of specific questions concerning the solution of the Navier-Stokes equations, in particular for large Reynold's number. The theory of analytic functions, the cal-

culus of variations, and of ordinary and partial differential equations, are used to analyze boundary value problems for nonlinear elliptic equations of second order, to study the uniformization of special partial differential equations, to study univalent functions, eigenvalue problems, variational problems with inequalities, and to analyze certain nonlinear systems of partial differential equations.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0005, GIGABIT LOGIC DESIGN

D. BREUER, T R W Incorporated, *Redondo Beach, California* 90278 (F33615-73-C-1110)

The objective of this effort is to provide monolithic logic circuits capable of achieving logic processing rates of one gigabit per second. Such rates are required for systems requiring digital processing of a special purpose category as encountered in side-looking radar, image enhancement and in coherent detection. Present approaches involve mass memory and/or ground processing which defeat real time, on-board requirements.

The possibility of achieving the required rates in monolithic structures is dependent on lowered power dissipation, increased reduction of stray capacitance and closer spacing and matching of devices. Improvements in dielectric isolation, masking and definition, along with improved device structures, now support the feasibility of obtaining logic of this capability. The present hybrid structures for this type of circuitry are far too costly and susceptible to variation to be attractive for any high volume usage.

Supporting agency address information: AF Avionics Laboratory TEA, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0006, INTEGRATED DEVICE ANALYSIS, MODELING AND DESIGN

J.L. DUNKLEY, Solid State Research Inc., *Santa Clara, California* (F33615-73-C-1101)

Digital subassemblies with maximum data rate and minimum power, demand improved integrated transistors with higher switching speed at currents below 3ma. Objective of this effort is the development of device analysis, computer modeling and specific device design procedures in order to design and evaluate greatly improved integrated devices.

Step 1- measurements and physical analysis of devices fabricated by AFAL/TEA which include transistors used in existing circuits, and special test devices designed by contractor. Step 2- device modeling for computer-aided circuit analysis with special emphasis on verification of measurement results from step 1. Analysis of integrated sub-circuit switching behavior. Step 3- parameter tradeoff and device design for maximum switching speed at low currents, utilizing the existing AFAL integration process. Recommendations for process alterations. Several cycles of step 1, 2 and 3 are planned.

Supporting agency address information: AF Avionics Laboratory TEA, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0007, SUPERSONIC DIFFUSER RESEARCH

P.P. WEGENER, Yale University, School of Engineering, *New Haven, Connecticut* 06520 (F44620-73-C-0032)

The Air Force high intensity radiation program relies heavily upon the improvement of the state of the art in flowing gas lasers. The supersonic diffuser is a critical component in this technology, and it is not yet capable of achieving the necessary pressure recovery for practical operation with permissible size and weight limitations. Intensive effort on diffusers was essentially stopped around ten years ago, and diffuser design is still more of an art than a science. This research effort, by a principal investigator with extensive experience in the history of diffusers, will attempt to put the subject on a more scientific footing while at the same time remaining alert for specific solutions to some immediate air force needs. The current effort will concentrate on some experiments with a few simple configurations of supersonic diffusers. A Ludwieg tube and a continuous flow wind tunnel will both be employed.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0008, CYCLONE SEPARATOR

W. WESTERMAN, McDonnell Douglas Corporation, *Titusville, Florida* 32780 (DAAG39-73-C-0100)

To determine the effectiveness of cyclone separtators on conditioning fluidic power supplies. The specific power supplies to be investigated are solid propellant exhaust gases and turbine engine bleed gases.

In the first series of tests, simulated solid propellant exhaust gases will be supplied to two sets of fluidic circuits--one conditioned by a cyclone separator and the other unconditioned. The second series of tests will use actual solid propellant gases in the same test procedure. In the third phase, turbine engine bleed gases will be simulated and tests run as in the first two phases.

Supporting agency address information: AMC Harry Diamond Labs, Washington, D.C. 20438

SUPPORTED BY U.S. Dept. of Defense - Army

4.0009, DISSOCIATION GAS DYNAMIC LASER

J. WILSON, Univ. Daix Marseille, *Marseille, France*

To achieve lasing action in a recombining gas and to demonstrate the potential for making high power, efficient lasers that operate in the visible part of the spectrum.

Oxygen will be compressed in the incident wave in a shock tunnel and heated to about 4000 degrees K. Expansion through a mach 4 nozzle will cool the gas to about 1000 degrees K, and recombination will occur. Gain will be measured in the recombining gas near the 4000A spectral region. If gain is sufficient, a laser can be made on the shock tunnel.

Supporting agency address information: AF Weapons Laboratory LRT, Kirtland AFB, New Mexico 87117

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0010, MATRIX CATHODE EVALUATION

O. DOEHLER, Warnecke Electron Tubes Inc., *Des Plaines, Illinois* 60018 (F33615-74-C-1087)

To provide sample quantities of matrix cathode material for evaluation of the material's thermionic emission properties, lifetime, activation process, manufacturability and performance in operating microwave amplifiers.

Small samples of a new matrix cathode material have been made at AFAL which is malleable (may be stamped instead of machined), tolerant of leaks (may be reactivated after exposure to air) and which shows excellent uniformity of emission. Some of these samples have been distributed to the microwave tube industry for evaluation. All those receiving the material have been impressed by the superior qualities and are desirous of obtaining more of the material. In order to provide a wider distribution of material for evaluation and to initiate detailed evaluation of the properties of the material, it is necessary to establish more regulated fabrication of the material. This effort is to set up a fabrication facility, produce sample quantities of the mateial under rigid control and initiate evaluation by life test, emission studies and by incorporation into microwave tubes for comparison to existing cathodes.

Supporting agency address information: AF Avionics Laboratory TEM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0011, AN EXPERIMENTAL AND ANALYTICAL RESEARCH PROGRAM IN TRANSONIC FLOW

H.D. THOMPSON, Purdue University, School of Engineering, *Lafayette, Indiana* 47907 (DAAH01-72-C-0089)

The objective of this work unit is to design, develop, and construct a laser Doppler velocimeter system for simultaneous two-component velocity measurement. The device is to be extensively calibrated and tested by the contractor for transonic flows and turbulent free jet flows.

Analytical techniques for predicting the quantities to be measured are to be studied and/or originated. Previous experimental results will be collected. This will provide design parameters for comparison and consideration during the design and development stages.

Supporting agency address information: MICOM Aeroballistics Directorate, Redstone AR, Al. 35809

SUPPORTED BY U.S. Dept. of Defense - Army

4.0012, FINITE ELEMENT METHODS APPLIED TO FLUID MECHANICS

L.G. NAPOLITANO, Univ. Degli Studi, *Naples, Italy* (AF-AFOSR-2704-74)

Both present and future AF aerospace vehicles will be required to fly at high speeds and have an ability to maneuver at these speeds. This will require that new and improved engineering design and analysis methods be developed throughout the total speed regime for the precise engineering determination of the performance and system capabilities of those vehicles. This research will attempt to develop new methods for fluid dynamical analysis using high speed computers, methods which should circumvent the disadvantages of currently employed machine algorithms. In particular, this research will systematically apply functional analysis to the development of finite element techniques for the solution of fluid mechanical problems, thereby unifying the many treatments in the literature that now appear superficially different, and framing into a clearly defined context the problems and questions that still remain to be resolved before finite element methods can be employed rigorously and economically in fluid mechanical analysis.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0013, MILLIMETER WAVE TR TUBE DEVELOPMENT

H. GOLDIE, Westinghouse Electric Corp., *Baltimore, Maryland* 21227 (F33615-72-C-1166)

The objective of this program is to continue development of a broadband, active plasma waveguide switch being presently developed under contract F33615-70-C-1118. This switch operates as a receiver- protector switch for use in proposed and existing millimeter wave radar. The plasma switch must have high power, high isolation capability of 100db over 60-96 GHz at 5kw power levels and insertion losses less than 1db over the entire bandwidth. This program will establish reliability and lifetime characteristics of the tube.

The plasma switch previously developed under contract F33615-70-C- 1118 will be tested for window and tube integrity at 5kw input power. Several tubes will be built to test isolation ratio achieved at 5kw input at 95GHz and to test new cathode material and 'keep alive' grip structure. Lifetime tests of at least 1000 hours duration will be made.

Supporting agency address information: AF Avionics Laboratory TEM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0014, HIGH SPEED MICROWAVE RECEIVER PROTECTOR DEVELOPMENT

H. GOLDIE, Westinghouse Electric Corp., *Baltimore, Maryland* 21227 (F33615-72-C-2054)

The objective of this program is to solve the Schottky-barrier diode burnout problem in present radars by improving receiver protection through development of faster switching TR tubes. Response times of ordinary all-gas TR's are typically 1 to 5 nanoseconds depending on design Q's and overall bandwidth. This program would develop TR switching time of one half nanosecond with adequate receiver protection from both high power synchronized pulse power and from interfering unsynchronized nanosecond bursts in a jamming environment.

The approach would be to have a multi-stage tr limiter composed of three plasma type limiters and two solid state type limiters. This approach allows for multi-stage protection, each stage protecting the succeeding stage, and providing an overall switching time of less than a nanosecond.

Supporting agency address information: AF Avionics Laboratory TEM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0015, RADIO POSITION FIXING TEST & EVALUATION

C. KEARSE, U.S. Dept. of Commerce, Natl. Ocean Survey, *Rockville, Maryland* 20852

Objective: To determine the capability of existing radio position fixing systems to meet evolving NOS requirements.

Approach: Operational requirements will be developed and from these functional specifications written. A test plan will be developed and laboratory and field tests will be conducted.

At present, plans are to evaluate the X-Band near-shore line-of- sight systems (Motorola and Decca) first followed by the low frequency systems (Hi Fix and Raydist).

Progress: Operational requirements have been synthesized and a contract awarded to develop a test and evaluation plan for the line-of- sight on systems.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

4.0016, SELECTED PROBLEMS IN SYSTEM ENGINEERING

W.A. PORTER, Univ. of Michigan, School of Engineering, *Ann Arbor, Michigan* 48106 (AF-AFOSR-2427-73)

Complex system engineering problems are continually encountered as a result of using a system level approach for obtaining maximum mission effectiveness in Air Force aerospace vehicles and support equipment and as a result of integrating subsystem level technology advances. Due to their complexity, these problems are often not satisfactorily resolved by existing mathematical system theory and methodology. This continuing research effort promises a new more powerful framework for engineering analysis and design, the group resolution space. For example, a major objective is the removal of the assumptions of linearity and Hilbert space structure used in conventional system theory. This will in turn permit a new approach to exploring the critical interface between theory and actual system behavior in such areas as system sensitivity to parameter variation, stability of system response, optimality of control forces, identification of system parameters, and system modeling. Specific tasks include the development of a causality structure for nonlinear functions, investigation of state decomposition for operators on a resolution space, and evaluation of Gohberg-Krein integral techniques. Emphasis during the coming year will be placed on the class of systems describable by polynomic operators.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0017, ELECTROMAGNETIC SOUND GENERATION FOR NON-DESTRUCTIVE TESTING

T.J. MORAN, Wayne State University, School of Liberal Arts, *Detroit, Michigan* 48202 (AF-AFOSR-2648-74)

Failure of materials in AF systems is costly, and often disastrous. New methods of non-destructively evaluating (NDE) materials are needed to prevent castastrophic failure and to extend useful life of expensive components in engines and air frames. This research is to develop a NDE technique which takes advantage of the versatility associated with ultrasonic waves generated without physical contact with the material. A judicious selection of geometry allows either shear or compressional ultrasonic waves to be launched at the boundary of the material by virtue of the Lorentz force on the surface eddy currents in the presence of a static magnetic field. This contact-less method will be studied with lower field permanent magnetics and with a secondary electromagnetic coil oriented near the RF coil. The specificity of defect shape orientation will be examined.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0018, STUDIES OF GAS DYNAMIC PHENOMENA ASSOCIATED WITH HIGH POWER LASERS
C.D. DONALDSON, Aeronautical Res. Associates, *Princeton, New Jersey* 08540 (F44620-74-C-0010)

The Air Force advanced radiation program has need of improving the state of the art for the design of diffusers, nozzles, and aerodynamic windows. This research is directed toward a practical method of computing the turbulent gas dynamic flow properties required for such improvements. The method second order closure will be used to analyze and compute turbulent flow correlation variables for diffusers and aerodynamic windows. Included will be predictions of average temperature, velocity, pressure, and density; boundary layer thickness, displacement thickness, and momentum thickness; turbulent intensities, shear correlation, heat transfer correlations, and the mean square density and temperature fluctuations.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0019, HIGH POWER HIGH EFFICIENCY SOURCES
K.K. CHANG, Radio Corporation of America, *Princeton, New Jersey* 08540 (F33615-72-C-1678)

The silicon avalanche diode operating in the high efficiency (or Trapatt) mode has emerged as a promising solid state device for microwave power generating systems. This device has demonstrated a capability to generate pulse powers of over a hundred watts at I-band (8-10 GHz) by harmonic extraction with 5-10 percent efficiencies and as high as 43 percent in the fundamental trapatt mode. The objective of this program is to develop optimum semiconductor diode structures and circuits for high efficiency operation as amplifiers and oscillators at 10 GHz.

This development effort will consist of semiconductor diode design and fabrication, circuit design and fabrication, and testing as necessary to demonstrate the required amplifier/oscillator characteristics.

Supporting agency address information: AF Avionics Laboratory TEM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0020, SOLID STATE TRAVELING WAVE AMPLIFIER
R. DEAN, Radio Corporation of America, *Princeton, New Jersey* 08540 (F33615-72-C-1616)

This program is for both experimental and theoretical studies to develop the traveling wave transistor as a practical device for microwave systems applications.

Task I will encompass three distinct areas. Signal processing: New devices will be designed to bring about an increase in the phase shift that can be obtained at constant net gain and to increase the frequency range over which the constant-gain, phase-shifting capability can be utilized. These devices will also be studied to evaluate new threshold- sensitive effects which might be employed for simple switching functions, including memory. Low noise amplification- effort will be directed towards a reduction in noise figure, while simultaneously increasing the gain-bandwidth product. High power amplification- effort will investigate improvements in the output coupler portion of the device as well as methods for integrating other separate amplifiers onto the same semiconductor chip. Task II will be directed towards the development of ultra high speed logic circuits using planar GaAs devices.

Supporting agency address information: AF Avionics Laboratory TEM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0021, ADVANCED CMOS CIRCUIT TECHNIQUES
J. SCOTT, Radio Corporation of America, *Princeton, New Jersey* 08540 (F33615-72-C-1291)

The objective of this work effort is to further advance the functional capabilities of CMOS circuit techniques on insulating substrates and fabricate complex circuit arrays which have potential application to advanced digital equipments. Specific circuit development will include a 10x10 bit high speed multiplier for potential FFT applications and a digital correlator capable of handling 100 MHz data rates.

The contractor will define all processing steps in detail and determine their relationship to device parameters. Silicon films less than one micrometer thick will be deposited on insulating substrates and complementary MOS silicon gate transistors will be fabricated with five micrometer channel lengths. Beam leads will be employed to achieve efficient lsi packaging.

Supporting agency address information: AF Avionics Laboratory TEA, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0022, MNOS MEMORY ON INSULATING SUBSTRATES
J. SCOTT, Radio Corporation of America, *Princeton, New Jersey* 08540 (F33615-72-C-1679)

The objective of this effort is the development of high density, high speed electrically alterable read-only memory for use in guidance, control and general radar processing applications. Specifically, the objective is to develop metal-nitride-oxide-semiconductor (MNOS) fully decoded integrated circuits on insulating substrates to achieve radiation hard devices with read access times of 400 nanoseconds, one millisecond write time, and non-volatility.

A proven three terminal MNOS element will be used which achieves a six volt threshold shift with a 23 volt one millisecond write pulse. Static p-channel technology with aluminum gates will be used and a clean oxide process will be employed to achieve radiation hard, stable MOS decode and other peripheral circuitry. A 256 bit (64x4) array will be designed and fabricated and the arrays will be tested for reliability and radiation hardness.

Supporting agency address information: AF Avionics Laboratory TEA, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0023, LASER BEAM GENERATION
J.W. ENGEL, U.S. Air Force, Weapons Laboratory, *Albuquerque, New Mexico* 87117

To investigate a variety of optical resonators coupled to an hf/df chemical laser in order to understand the complicated laser beam generation process.

Experiments to characterize the active laser medium in terms of its volume, gain, and spectral distribution will be performed to understand more fully the lasing processes. Closed-cavity, transmission-coupled stable resonators, Schlieren flowfield diagnostics, chemiluminescence, and advanced power extraction techniques will be utilized as feasible. The beam quality from those optical configurations offering the most potential will be measured. This work will be performed on a flowing supersonic CW device at Kirtland AFB.

Supporting agency address information: AF Weapons Laboratory ALO, Kirtland AFB, New Mexico 87117

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0024, MEMORY FOR RADAR
G. AMELIO, Fairchild Camera & Instr. Corp, *Syosset, New York* 11791 (F33615-73-C-1044)

The digital approach to high resolution synthetic aperture radars requires large amounts of memory for both the radar processor and scan converter. Minimization of the initial cost as well as the total cost of ownership of such systems requires that they be based on an extremely low cost memory device which is reliable, small in size, and dissipates little power. The objective of this program is to develop an extremely low cost CCD shift register memory chip which can be configured into sar processors and scan converters. The low cost requirement necessitates the development of a reliable memory device which has widespread applications in addition to radar systems and which eventually will be made available on the commercial memory market.

A 32k bit CCD memory chip will be developed with an access time sufficiently short to allow widespread military and commercial use. During this two year program the following tasks will be performed: (1) analysis of memory system designs and thier influence on chip organization (6 months), (2) design and fabrication of the memory chip and the required intermediate test structures (15 months), and (3) the design and fabrication of a 100k

bit memory module (3 months). A line addressable random access memory (LARAM) chip organization has been chosen as the best candidate vehicle for this program. The program will result in the feasibility demonstration of the CCD memory chip and module, and the generation of sufficient applications data to permit the design of various radar memory systems.

Supporting agency address information: AF Avionics Laboratory TEA, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0025, COMPOUND WEIBULL DISTRIBUTION
R.A. EVANS, Systems Sci. Incorporated, *Chapel Hill, North Carolina* (F33615-73-C-4092)

AF function - life testing and estimation in reliability studies. Deficiency - need for improved statistical procedures in reliability engineering. Research - time saving in life testing, estimation of parameters of compound Weibull distribution, and generalizations of tests of hypotheses concerning minimum life. How research contributes - better procedures for evaluating the reliability of Air Force hardware.

Under a previous contract, research has been performed on time saving in life testing and on estimation of the parameters of a compound Weibull distribution. Under this contract, further research will be performed on these problems, the properties of generalizations of tests of hypotheses concerning minimum life will be investigated, and other results relevant to statistical procedures in reliability engineering will be obtained as time and funds allow. Specifically, the properties of various measures of time saved by placing n (greater than r) items on test when r failures are to be observed in a life test will be investigated. A study will be made of the properties of maximum likelihood, moment, and percentile estimators of the parameters of a compound Weibull distribution, and a study will be made of the properties of generalizations, based on multiple failure data, of a simple test function based on the first two failure times and of the likelihood ratio test of hypotheses concerning the location parameter (minimum life or guarantee time) of an exponential failure distribution with unknown scale parameter. The results will be applied to Air Force reliability engineering problems.

Supporting agency address information: Aerospace Research Laboratory LB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0026, EXPERIMENTAL INVESTIGATION OF HEAT RELEASE IN A PARTICLE-SEEDED VORTEX
R.A. ROBINSON, Battelle Memorial Institute, *Columbus, Ohio* 43201 (F33615-73-C-4027)

AF function - advanced energy transfer systems. Deficiency - there exists insufficient knowledge of the operating characteristics of highly loaded multicomponent vortex flows having high energy densities. Research - study the effects of heat release from suspended particles on the dynamics of a multicomponent vortex. How research contributes - studies of the dynamics of multicomponent flow vortices have thus far been limited to systems in which energy densities are low and, consequently, the effects of particle heat release on vortex flow are negligible. This research will, by investigating multicomponent flows having high energy densities, enable a determination of the scaling laws necessary to extrapolate existing results to systems having considerably higher energy densities.

A small vortex chamber, similar in design to those at ARL, is to be constructed and laboratory tested with air, helium and stainless steel powder. This vortex is to be fitted into the side of the core of the BMI research reactor. With uranium dioxide as the vortex powder load and helium as the driving gas, the system will constitute a subcritical assembly capable of achieving particle temperatures on the order of 1000 degrees C. Vortex characteristics such as bed thickness, temperature, pressure, and turbulence levels are to be measured for various power levels, flow rates, and chamber loadings. Results will be analyzed to determine vortex flow and heat transfer characteristics at various power levels. Scaling relationships will then be developed to enable the extrapolation of these results to vortex systems having particle temperatures on the order of 3000 degrees C.

Supporting agency address information: Aerospace Research Laboratory LE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0027, FLUID DYNAMIC INTERACTIONS IN MULTIPLE NOZZLE ARRAYS
S.L. PETRIE, Ohio State University, School of Engineering, *Columbus, Ohio* 43212 (AF-AFOSR-2537-73)

The AF advanced radiation technology program relies heavily upon the improvement of the state of the art in flowing gas lasers. Particularly in chemical lasers, the mixing of supersonic streams of reactants in the wake regions of nozzle elements confronts the designer with difficult compromises between optical properties and the necessary flow mixing and chemistry. This effort is an attempt to gain more basic understanding of the detailed mechanisms involved in order to facilitate the rational design balance of the conflicting requirements. An arc heated supersonic wind tunnel will be fitted with a double supersonic nozzle arranged to permit mass injection at the downstream lip of the center nozzle block. Detailed diagnostics will be performed of the wake region, including reaction product species concentrations as well as all pertinent flow properties needed to analyze the supersonic mixing, chemical effects, and the optical inhomogeneities of the region.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0028, NETWORK ANALYZER
J.E. ADAIR, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

To provide a microwave and millimeter device and circuit testing capability to allow rapid and accurate parameter definition and device evaluation. To make these measurements in a sufficiently accurate, precise, and repeatable manner so valid technical evaluation is possible. To test these items in a manner compatible with the most advanced industrial research evaluation procedures so that a meaningful technical dialogue is possible. To make the appropriate measurement as rapidly as possible to minimize test equipment or item under test parameter drift and to provide design feedback in a useful period.

To tailor and modify the hardware and software of an automated Hewlett-Packard network analyzer system for optimum AFAL utilization. This includes all manner of reflection and transmission parameter, particularly s-parameter, determination up to 40 GHz, with growth potential into higher millimeter frequencies. Entire testing sequences can be programmed so that the test run error due to standard drift is held to a minimum. Interactive and design feedback software will be implemented so that the true effect of design changes can be assessed. Particular accuracy and precision estimates depend upon frequency, speed and type of measurement, but in all cases meet or exceed general industrial design lab standards.

Supporting agency address information: AF Avionics Laboratory TEM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0029, ESM PROCESSING TECHNIQUES EVALUATION
J. CASCHERA, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

To access trends in ESM processor technology as they apply to present and future ESM needs and requirements and to devise the criteria and means for evaluating preprocessor/processor configurations developed into hardware.

To generate pulse data digitally in the format outputed by candidate receivers at pulse data rates typical of the environment. This can be done by assembling a number of pulse generating devices and combining their outputs.

Supporting agency address information: AF Avionics Laboratory WRP, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0030, EVALUATION OF ELECTRO-OPTICAL COMPONENTS
G.M. FITZGIBBON, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

To evaluate contractually developed electro-optic components in the inhouse laboratory of AFAL/TEL. The high power gallium arsenide laser (61000334), the multispectral gallium arsenide laser (61000331), the high radiance gallium arsenide laser (76290409), the laser boresight tool (61000524), the sunpumped laser prototype (61000609) are a few of the devices to be evaluated by AFAL/TEL personnel.

The results of the evaluations will usually be AFAL/TE Technical Memos.

Supporting agency address information: AF Avionics Laboratory TEL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0031, INTEGRATED CIRCUIT TECHNIQUES

E.M. FRIAR, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

Advanced avionics subsystems, such as digital processors for radar and communications, require advanced integrated circuitry with increased switching rates and reduced power consumption. The objective of this work unit is to provide the in-house technology base, in the form of an integrated circuit fabrication facility, with the necessary processing techniques to develop sophisticated circuitry for advanced avionics subsystems. Short-term goals include capabilities such as 2-level metallization, deposited oxide masking and silane epitaxy. The long term goal is to provide an outstanding in-house AFAL capability to develop special low cost, high speed, high priority circuits for avionics applications.

To solve critical digital avionics problems through establishment and operation of an inhouse center of excellence in integrated circuit technology. Provide the technology base for conception, development, computer aided design and verification, and fabrication of special purpose, high speed, low cost integrated circuits. Interface with user commands for maximum utilization of circuits. Develop and integrate specialized custom integrated circuits and devices in support of systems developments.

Supporting agency address information: AF Avionics Laboratory TEA, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0032, RADAR GROUND CLUTTER ANALYSIS AND SIMULATION

J. HAYNES, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

To obtain statistical information concerning ground clutter return from varied terrain types and depression angles, to update the latest IITRI clutter model and incorporate this information into a radar simulation program. This will culminate in the development of an IH capability of simulating existing and proposed radar systems on our computer and testing the response of these systems to different types of accurately simulated ground clutter so that the optimum system parameters can be chosen.

To take the computer tapes containing the ground clutter return and statistically analyze them on the ASD computer system. Use this information to update the clutter model and develop a data file of clutter maps for evaluating system performance using a radar simulation program developed by IITRI for determining probability of detection in a dynamic clutter background. This study will include the generation of histograms of radar cross section per unit area vs number of samples, for the various terrain types and depression angles as well as the mean and standard deviation. These statistics will be done for the various clutter models, e.g., Rayleigh and log-normal to determine their validity.

Supporting agency address information: AF Avionics Laboratory TEM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0033, ADAPTIVE, OPTICAL/ELECTRONIC HYBRID PROCESSING

F.E. HOWARD, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

To establish an inhouse capability in adaptive pattern recognition. emphasis will be placed first on feature determination, and then on feature extraction.

Adaptive, optical/electronic hybrid processing. A coherent optical data processor will be interfaced with a PDP 11/20 minicomputer. Feedback loops from the PDP 11/20 will control the size and the scanning path of the optical processor laser beam. The PDP 11/20 will also be programmed to rapidly compute various parameter values of the Fourier spectra information it receives from the optical processor/mini-computer interface device.

Supporting agency address information: AF Avionics Laboratory AAA, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0034, ADC SKY-QUALITY METER

L.S. MACKNIK, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

To provide ADC with an instrument which may be used at each operational Baker-Nunn camera site to measure atmospheric extinction of light, background sky brightness and ambient lighting conditions around each site. This instrument will also provide a means for determining in real time the faintest target (optical) which may be photographed under prevailing conditions. Production models of the instrument will be calibrated by AFAL/RSO. A recent requirement for site location of new ground-based E-O surveillance sensors has triggered evaluation of a new version of this instrument to evaluate simultaneously the transparency and sky brightness of a site on a quasi-continuous, night-to-night basis. This will be examined before 01 Jan. 75.

Theoretical and experimental information from classical astronomy has been used to calibrate a photoelectric photometer. The photometer may be mounted directly on the camera or used as a portable instrument. Calibration was carried out using stars of known brightness and an established theory (Baum) of the detection of faint targets. Production models of the sky-quality meter will be calibrated at AFAL John Bryan State Park site. See ARL Technical Reports ARL 71-0086 'Proposed Improvements in the SDC Spacetrack Optical Operations' (June 71) and ARL 71-0293 'A Study of the San Vito Dei Normanni Baker-Nunn Site with the ARL Sky- Quality Meter' (Dec. 71). The new site evaluation requirements under SAMSO PE 63424F suggests the use of several photo-sensors in a simultaneous array to observe Polaris as well as selected directions at the zenith and near the horizon. The FY74 money will purchase standard electronics, filters, photo-multiplier tubes and mounting hardware required to provide a suitably instrumented test setup to perform the required measurements which will maintain suitable calibration.

Supporting agency address information: AF Avionics Laboratory RSO, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0035, MAGNETIC MEMORY RESEARCH

M.G. MIER, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

Mass meories presently flying in AF systems are deficient in radiation tolerance, ruggedness, and long term untended reliability, excessive in size, weight, power requirements, and cost. These factors limit airborne and spaceborne systems applications (see ASD-TN-27-69- 51(1), SAMSO-TN-24-71-102, and ESD-TN-69-24-03). The objective of this inhouse work unit is to research magnetic memory techniques that show promise of contributing to new mass memory systems that will meet these criteria. Feasibility models and test vehicles will be constructed to research critical problems of these memories, with results phased into optimum memory design.

Areas to be considered will include the evaluation of devices constructed from novel bubble materials (e.g., non-rare-earth, non- crystalling, small bubbles, etc) and the design of the test apparatus necessary to perform this evaluation. Fy75 evaluation of magnetic bubble test devices will begin. Improved techniques for bubble propagation will be researched. Evaluation of contract deliverables will continue.

Supporting agency address information: AF Avionics Laboratory TEA, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0036, MOMENTUM AND ENERGY EXCHANGE PROCESSES IN MULTI COMPONENT JET PUMPING
D.K. MILLER, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio*

AF function - airborne laser system. Deficiency - lack of flight- weight pumping equipment to meet requirements for an airborne chemical laser system. Research - experimental and analytical investigation of multicomponent flow processes applied to gaseous pumping. How research contributes - gaseous pumping processes are envisioned, which depend on energy transfer phenomena of multicomponent media. These pumping concepts have the potential of providing a compact, lightweight pump for use with an airborne chemical laser system.

The basic aerodynamics of the relevant flow processes will be investigated, experimentally and analytically, to determine applicability of these concepts for the chemical laser pumping application, and to define ranges of operation. Additionally, an analysis of the overall pumping system will be made, to define energy, volume, and weight requirements for the system, and attempt to optimize the pumping cycles for airborne operation.

Supporting agency address information: Aerospace Research Laboratory LE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0037, SLANTED CASCADE DIFFUSER DESIGN
D.K. MILLER, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio*

AF function - high energy lasers. Deficiency - lack of high efficiency, compact, easily started diffuser for gas dynamic laser. Research - experiments and analytical studies of flow properties and pressure recovery in slanted cascade diffuser configurations. How research contributes - one of the principal difficulties in development of efficient diffusers for high mach number flow in the gas dynamic laser is the contraction ratio limit set by diffuser starting requirements. In the slanted blade cascade diffuser concept, a number of parallel blades are set at an angle to the flow direction, such that a relatively small contraction ratio is presented to the flow during diffuser starting. Because of the inclination of the blades to the flow, the supersonic streamline is deflected - the geometry of the blade system is such that a larger contraction ratio, and more efficient diffuser performance, is presented to the deflected streamline.

First priority of the research effort is directed toward the near term application of developing a short length supersonic diffuser for the GDL.

Supporting agency address information: Aerospace Research Laboratory LE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0038, BENCH-TEST AND INVESTIGATION OF CAPABILITIES OF MULTIPLE CHANNEL SAME FREQUENCY REPEATER SYSTEM
J.J. NEHEZ, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

The objective of this task is to laboratory test the multiple channel same frequency repeater (SFR) system. The laboratory test procedure will include investigation and exploration of the capabilities and limitations of the SFR system, and identification of candidate areas for further improvement.

The approach will be to identify significant operational factors (such as inter-channel isolation, signal intermodulation, channel spacing), assemble necessary test equipment, operate the system under controlled conditions, and gather and analyze the resulting data.

Supporting agency address information: AF Avionics Laboratory AAI, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0039, MNOS LIFETIME EVALUATION
F.L. SCHUERMEYER, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

The objective of this inhouse development effort is the study of the degradation of the threshold window of variable threshold transistors (VTT), such as MNOS transistors, and to improve their lifetime, write characteristics and retention time. This work is of importance since recent studies showed that the threshold window of VTT's degrades with many write and erase cycles. If this problem can be overcome, these devices will find application as random access memories and/or electrically alterable read only memory arrays. These memories are of importance for application in synthetic- aperture, real-time radar systems and in navigation computers, and frequency synthesizers.

MNOS transistors and/or similar variable threshold transistors will be fabricated by different methods and/or supplied by different companies. An evaluation apparatus, consisting of timers, pulsers, and digital data acquisition system will be designed and developed. The mechanism of device degradation will be correlated with device design parameters and processing variables.

Supporting agency address information: AF Avionics Laboratory TEA, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0040, MICROELECTRONIC CIRCUIT ANALYSIS AND APPLICATION
W.L. SPAID, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

This inhouse work unit supports a hands-on capability for personnel in micro-electronics development and utilization and provides insight into important trends in avionic circuit applications. The present objective is aimed at a first hand working knowledge of digital filters. In particular, the determination of optimum transforms has been undertaken with emphasis on the circuitry and logic design and their affects on cost and complexity. The resulting breadboard will be used as a vehicle for assemblies produced in the hybrid facility. This effort provides a supporting background for technology development in avionics required by future systems such as the B-1, F-15 and other advanced systems concepts.

Literature surveys and reports emanating from on- going contractual efforts are utilized as a background starting point for this effort. The choice of transforms are modeled and computer simulation performed. Circuit and logic organizations are breadboarded where unusual concepts are being considered. To accomplish this requires the assembly of some specialized test gear and the measurement of pertinent performance characteristics. The hybrid fabrication facility is required to construct assemblies which are not available off-the-shelf. This is a proven cost effective technique for innovative high performance circuitry. The transform will be appropriately breadboarded for demonstration and as a vehicle for obtaining data on technology developments as well as providing useful guidance to contractual exploratory development.

Supporting agency address information: AF Avionics Laboratory TEA, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0041, TECHNIQUES DEVELOP/DEVICE APPLICATION
T.W. THORPE, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

This facility will provide a means for development of new digital modems as well as the evaluation and test of existing vendor modems in the area of digital communications.

A prototype uhf digital modem will be built and evaluated as well as evaluation of the feasibility of several vendor modems.

Supporting agency address information: AF Avionics Laboratory AAI, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0042, ANTENNA MEASUREMENTS
H.E. WEBER, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

The general antenna measurement objectives are to- (1) maintain a suitable RF pattern and impedance measurement en-

vironment, pattern range instrumentation, digital data recording, off-line computer analysis interfaces, and limited real time display facilities, (2) perform antenna measurements for AFAL, ASD, outside AF/ government agencies, and/or contractors within the local area performing work on a government contract, and (3) perform measurements related to inhouse antenna developments and measurement system techniques.

Two discrete antenna ranges are housed in B-821. Low directivity (10 db nominal) elements are measured on a 20 ft by 20 ft sq ground plane range. A three ft diameter center section of the ground plane is a 0 plane rotation pedestal. Orthogonal plane motion is provided by a 15 ft radius boom having greater than 180 degrees freedom of movement with its rotation axis in the ground plane. Moderate to high directivity antennas are measured on the 60 ft indoor free space range. A 200 ft free space range is planned (but not yet implemented) thru large open doors at the source end of the 60 ft range. Large size RF absorber cone material was used throughout the range to extend its operation down to the 50-100 MHz frequency band. Digital data recording and off-line processing is available to both ranges. Real time polar and rectangular coordinate displays are available. Off line radiation distribution plots and three dimensional antenna plots can be produced from the digital data tapes.

Supporting agency address information: AF Avionics Laboratory TEM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0043, MODELLING OF BEAM DEFLECTION FLUID AMPLIFIERS 10927-E

A.J. HEALEY, Univ. of Texas, School of Engineering, *Austin, Texas* 78712 (DA-ARO(D)-31-124-73-G115)

To develop a rational fluid amplifier dynamic model which may be used to design amplifiers for specific applications. Relevance: This research is directly relevant to work on optimizing fluidic amplifiers at the Harry Diamond Laboratories. The TACOM indicates a potential value to research on fluidic control of semi-active suspensions.

1) The flow channel of beam deflection fluid amplifiers from the power jet outlet to the receiver inlet will be modelled. 2) Velocity profiles for the power jet and secondary jets will be determined experimentally. 3) Receiver geometry, power jet Reynolds number, and beam deflection will be varied independently to determine the effect of these parameters on the stability and frequency response of the fluid amplifier. 4) Theoretical models will be formulated for use in predicting these characteristics of device performance based on the variables studied.

Supporting agency address information: OCRD Research Office Durham, Box CM, Duke Station, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

4.0044, UNSTEADY BOUNDARY LAYER RESEARCH

D.P. TELIONIS, Virginia Polytechnic Institute, School of Engineering, *Blacksburg, Virginia* 24061 (AF-AFOSR-2361-72)

AF flight vehicles and propulsion systems involve many aspects of fluid flow past solid boundaries. Boundary layer theory and experiments represent a large proportion of the effort in aerodynamics research needed to improve the quantitative prediction of such phenomena as flow separation and reattachment, aerodynamic heating, and skin friction. Boundary layer research pertaining to the separation of boundary layers in time varying or intermittent flow is of particular relevance to rotating stall and gas turbine engine performance. This work pertains to boundary layer separation in laminar unsteady flow, but it is believed to be a possible foundation for work with the turbulent cases of practical interest for propulsion machinery. This effort will further the development of a new theory of boundary layer separation in unsteady flow and perform some test calculations of it. The theory developed by Telionis for unsteady viscous boundary layer separation will be developed further and computer tests will be performed for the case of oscillating flow over a circular cylinder, which can be compared with existing experimental data.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0045, LIGHT WEIGHT ELECTRIC MOTOR DRIVEN POL PUMPS FOR AIRMOBILE REFUELING SYSTEMS

E. REIMERS, U.S. Army, Mobility Eqp. Res. & Dev. Ctr., *Fort Belvoir, Virginia* 22060

To investigate and design a light weight electric motor pump drive system for remote fueling of airmobiles using standard fuel pump components. The electrical drive must be adaptive to either DC of 400 Hz, 3 phase AC on-board power sources.

The system contains an IHTS operated inverter using a center-tapped voltage step-up transformer. Depending on power size, the motor will be of the single phase variety with auxiliary starting phase or of the three phase variety. Voltage transformation makes it possible to utilize a light weight, low current cable to interconnect the on-board power conditioner unit with the remotely stationed motor pump fuel unit.

Supporting agency address information: TROSCOM Mobility Equipment R and D Center, Ft. Belvoir, Va. 22060

SUPPORTED BY U.S. Dept. of Defense - Army

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production And Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, AURORAL ZONE INFRASONICS

C.R. WILSON, Univ. of Alaska, School of Mathematics, *College, Alaska* 99735 (F44620-71-C-0064)

A number of Air Force systems either depend upon, or are affected by, the ionosphere in their operation. Ionospheric disturbances in the auroral region are of special concern to systems such as over-the- horizon (OTH) and ballistic-missile-defense (BMD) radars and nuclear monitoring networks, in addition to high-latitude communication nets. This research is to operate geophysical observatories at College, Stevens Village, and Fort Yukon. Equipment to be operated includes all- sky cameras, magnetometers, riometers, scanning spectrometers and infrasonic arrays. Data will be used to study the morphology of auroral infrasonic waves (AIW) and the generation mechanism of AIW. Specific studies will include Lorentz force coupling that transfers momentum from electrojet positive ions to the neutral atmosphere, ionization- collection process which increases the ion density in the auroral arcs, and the supersonic motion of the source region that determines the shock-wave geometry of AIW.

Supporting agency address information: AF Office of Scientific Research NPP, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0002, SPECTRAL CHARACTERISTICS OF INFRASONIC ACOUSTIC WAVES

R. CABRE, San Calixto Observatorio, *La Paz, Bolivia* (AF-AFOSR-2177-72)

A DOD/Air Force prime function is to conduct research on the improvement of detecting atmospheric nuclear explosions. This project is to operate and maintain an infrasonic array station. The data recorded will be analyzed to determine the azimuth, phase velocity, period, amplitude and dispersion of coherent signals crossing the array. These coherent signals will be used to determine the source mechanisms, wave propagation path, attenuation of energy, and effects of wind, temperature, and density distribution of the upper atmosphere on wave propagation at infrasonic frequencies.

Supporting agency address information: AF Office of Scientific Research NPG, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0003, CONJUGATE POINT RIOMETER PROGRAM

A.J. MASLEY, McDonnell Douglas Astron. Co., *Huntington Beach, California* 92647 (F44620-73-C-0063)

A number of Air Force systems either depend upon, or are affected by, the ionosphere and magnetosphere in their operation. These magnetically conjugate riometer stations will continue to provide a direct real-time measurement of ionospheric effects

due to precipitating radiation in the high polar cap. This information is necessary for understanding and evaluating high-latitude communications, radiation hazards, atmospheric density variations, and background electromagnetic emission at important wavelengths. General objectives of this research include the study of solar particle entry into and propagation within the magnetosphere, magnetospheric studies, charged-particle effects on the ionosphere, and the continued study and monitoring of all solar particle events in an intercomparable manner. These data will be used in conjunction with the upcoming experiments aboard the ATS-F satellite. The polar riometer data has been selected as an international standard to be published in solar geophysical data.

Supporting agency address information: AF Office of Scientific Research NPP, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0004, INTERACTION OF VLF WAVES AND ENERGETIC ELECTRONS IN THE MAGNETOSPHERE
R.A. HELLIWELL, Stanford University, School of Engineering, *Palo Alto, California* 94305 (F44620-72-C-0058)

Many Air Force systems either depend upon or are affected by phenomena occurring in the earth's magnetosphere and ionosphere. This study is particularly relevant to the improvement of communication and navigation systems and to environment control. Work on understanding wave-particle interactions in the magnetosphere will continue in two main areas. First, the mechanism of generation of discrete VLF emissions will be investigated using extensions of a newly-developed computer model. Second, models to describe the precipitation of electrons by narrowband whistler-mode waves will be developed. Ionospheric effects such as x-ray production, ionization production and auroral light, caused by electron precipitation in the magnetosphere will also be considered. Results from these studies will be integrated with experimental data from the Stanford Conjugate Point Program at Siple Station, Antarctica and Roberval, Canada.

Supporting agency address information: AF Office of Scientific Research NPP, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0005, NONEQUILIBRIUM FLOW EFFECTS IN HIGH-SPEED FLIGHT
W. VINCENTI, Stanford University, School of Engineering, *Palo Alto, California* 94305 (AF-AFOSR-2613-74)

This work relates to gas laser technology, to high altitude atmospheric environment, and to rocket instabilities. The objective is to provide fundamental understanding of the interaction of nonequilibrium radiation with gas flows and of nonequilibrium steady state ambient vibrational energy with acoustic waves. The work will be coordinated closely with an experimental program on gas dynamic phenomena in the presence of nonequilibrium radiative and vibrational processes being carried out in part by the same investigator under a grant from NSF. The work on acoustic amplification by ambient vibrational nonequilibrium will be continued. The new problems to be considered are the influence of ambient radiation on acoustic-gravity waves below 80 km altitude and the consideration of waves in bounded (as opposed to unbounded) systems. The latter effort is the one which may lead to new results relevant to rocket instabilities.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0006, NOISE CONTROL BY LIQUID VAPORIZATION
F.E. MARBLE, Calif. Inst. of Technology, Graduate School, *Pasadena, California* 91109 (AF-AFOSR-2068-71)

Strategic bombardment, tactical operations, and logistic support are AF functions which require the use of high performance flight vehicles. The operation of such vehicles produces intense noise from sources associated with propulsion systems. Because of a lack of a basic understanding of the physical behavior of sound and the interaction of sound with the fluid medium it is traveling through, rational noise control and avoidance is difficult. This noise can cause degradation in human performance, reduced reliability of structural and equipment subsystems and increased maintenance. The proposed research will investigate the behavior of high intensity sound as it interacts with liquid droplets. Specifically, an analysis will be made of nonlinear acoustic disturbances in a heterogeneous gas-liquid mixture where transition between the two phases constitutes an important element of the problem. Particular stress will be given to the wave steepening beyond the plane of generation, to the attenuation of duct modes and to the effect of phase change attenuation on acoustic fields resulting from gas-dynamic interaction with sharp edges.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0007, CONSTRUCTION OF A BALLOON-BORNE LIQUID HELIUM COOLED SPECTROMETER SYSTEM
D. MURCRAY, Univ. of Denver, School of Arts, *Denver, Colorado* 80210 (DAAD05-72-C-0364)

To make accurate, simultaneous measurements of selected minor constitutents (e.g., H2O, HNO3, O3, NO2, NO) over the altitude range surface to 40 km.

An ultrasensitive balloon-borne infrared spectral radiometer will obtain moderately high resolution spectra of atmospheric thermal emission. These spectra will then be analyzed to obtain mixing ratio profiles of the above mentioned molecules.

Supporting agency address information: AMC Ballistic Research Labs, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

5.0008, CONSTRUCTION OF A COMPUTER-BASED LANDSCAPE MODEL OF THE CACHE LA POUDRE (PINGREE PARK) WATERSHED
L.D. MILLER, Colorado State University, Agricultural Experiment Sta., *Fort Collins, Colorado* 80521 (COL00352)

Objective: Prepare a computer-based landscape model of 233 sq km mountain watershed containing .23x10 to 2.3x10 discrete landscape cells. Utilize this landscape model as an input to a watershed simulation model. Apply aircraft remote sensing to obtain additional landscape data overlays for the model. Determine the possibility of using ERTS-A and B resource satellite data to provide further dynamic overlays for this landscape model.

Approach: Select a final ground cell size between 1/4 and 1/40 of an acre. Reduce the 1/24,000 contour maps of the selected 233 sq km watershed to digital data at the cell size using a coordinagraph. Interpolate this data for the mean elevation of each cell using surface fitting routines on a digital computer. Compute the mean slope and mean aspect of each cell using the mean elevation data. Overlay the geologic substructure, vegetation type, stand density, and stream net data into each cell using the available maps and the coordinagraph. Apply aerial remote sensing systems such as thermal mapping, color photograph, and multiband photography to collect information on the transient spatial aspects of the basin-e.g. snow distribution and leaf color changes--and overlay these characteristics into the cells. The model will next be correlated cell by cell with the classifications of the watershed by the Earth Resource Technology Satellite with a resolution of 1 acre to determine what portion of the data might have been collected by the satellite. Finally the utility of this model as the input spatial- hydrologic unit data in a watershed.

Progress: The landscape model has been completed and tested against the slope and aspect data for the entire Little South Watershed. Progress in the past year has been directed at compiling the data base for additional model overlays including the vegetation data and other physical data. At present the vegetation type maps have been completed and field checked. Vegetation type maps include density, height, and basal area classes as well as species. Because of the large number of mapping cells derived, the vegetation data will be digitized for a small sub-basin rather than the entire watershed. The model will be used to test the information content of various sized cells using the basic 1/4 acre cell as the standard and determining the loss of accuracy as the cell size mapped increases.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

5.0009, THE GEOCHEMISTRY AND GEOCHRONOMETRY OF DEEP-SEA DEPOSITS
K.K. TUREKIAN, Yale University, Graduate School, *New Haven, Connecticut* 06520

This research is broadly directed toward continuing investigations into geochemistry and geochronometry of deep-sea deposits. Areas of special interest will include the following: (1) Ar40/Ar39 dating of marine volcanics and sediments, (2) The sedimentary history of the Canary Basin in collaboration with researchers from the University of Rhode Island and NOAA, (3) Fission track dating of volcanic glass shards in deep-sea cores, and (4) The pattern of Sr87/Sr86 distribution in the detrital fraction of deep-sea sediments as a function of time. In these studies, use will be made of materials collected by surface ships and through the Deep-Sea Drilling Project.

SUPPORTED BY U.S. Natl. Science Foundation

5.0010, CHEMICAL KINETICS OF SOME ELEMENTARY REACTIONS OF OXYGEN ATOMS
R.B. TIMMONS, Catholic University of America, School of Arts, *Washington, District of Columbia* 20017 (AF-AFOSR-2378-72)

Air Force operations in the upper atmosphere are influenced by chemical reactions and concentrations of reactants and products which have an effect on communications, detection, and environmental conditions. Still unknown are certain chemical and kinetic facts related to the hypothetical destruction of the present ozone ultraviolet protective screen by flights of supersonic and other aircraft in the stratosphere. Precise knowledge of reactions and reaction kinetics involving oxygen, ozone, nitrogen oxides, and other reactant species in the stratosphere will provide for an intelligent assessment of potential Air Force flight operations at high altitudes. In order to assess fully the influence of variations in this environment, it is necessary to know the concentrations of reactant species, the kinetics of reactions involved, and how these reactions are influenced by radiation. This research employs electron spin resonance and mass spectrometric methods to investigate the chemical kinetics of a number of elementary reactions of oxygen atoms. The reactions chosen for study are of importance with respect to reaction rate theory developments as well as of practical significance with respect to problems of atmospheric pollution. Reactions will be studied using fast flow apparatus and the kinetics determined over wide ranges in temperature.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0011, NAVY ENVIRONMENT: CONTROL OF LOCAL FLIGHT OPERATIONS IN INTENSIVE CLOUD MASSES
R.M. LHERMITTE, Univ. of Miami, School of Marine Science, *Miami, Florida* 33149 (N00014-67-A-0201-0021)

The objective of this research is to eventually furnish a remote sensing capability to naval units for surveying the atmospheric motion in large cloud masses. The naval application would be mainly to forecasting for and control of local flight operations.

The method of survey is by means of dual Doppler radar which from opposite ends of a base line surveys a common portion of a cloud mass. The problem heretofore in conducting such research has been the lack of a system of radars so coupled and extensively gated, and additionally with rapid scanning ability to sample enough data points in the cloud mass to enable determination of the internal cloud circulation. Such equipment is now available under this task and is the principal tool of research.

Supporting agency address information: Office of Naval Research 412, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0012, ULTRASONIC AND AUDIBLE ACOUSTIC EMISSIONS FROM COMPOSITE SOLID PROPELLANTS
W.C. STRAHLE, Georgia Inst. of Technology, School of Aerospace Engin., *Atlanta, Georgia* 30332 (AF-AFOSR-2663-74)

This research supports the updated RO 5.1 in its analysis of acoustic diagnostics of solid propellant combustion. The work will proceed on an exploratory basis in an attempt to understand two recently discovered phenomena: (1) ultrasonic emissions from deflagrating composite propellants and (2) the intense audible noise emitted from deflagrating composite propellants. These phenomena are currently believed to have bearing on deflagration behavior diagnostics and combustion instability behavior, respectively. It is proposed that an apparatus be designed and constructed to simultaneously record ultrasonic and audible emissions during high pressure deflagration with the goals in mind of (a) obtaining both acoustic power and spectra, (b) deducing methods of making the ultrasonic emission experiment more useful in deflagration diagnostics and (c) determining the relationship between combustion noise and instability.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0013, COMPOSITION OF THE ATMOSPHERE AT TEN THOUSAND TO FORTY THOUSAND FEET USING A MODIFIED MATRIX ISOLATION TECHNIQUE
A. SNELSON, I I T Research Institute, *Chicago, Illinois* 60616 (F44620-74-C-0033)

The development of laser technology for communications, guidance, detection and weapons requires accurate assessment of the attenuation of laser beams on passage through the atmosphere. Such assessment may be made by computer calculations or by laboratory experiments using synthetic atmospheres for various altitudes. In either case, it is necessary that the concentration of all constituents of the atmosphere be known accurately as a function of altitude. Many of the concentrations, especially of species present in small amounts, are not sufficiently well-known. In this research, a modified matrix isolation technique will be used to sample and analyze the atmosphere at altitudes between 10,000 and 40,000 feet. For this purpose, a cryogenic sampler developed for use at higher altitudes will be modified and used aboard a WB57f aircraft provided by the Air Force. Samples will be returned to the contractor's laboratory and there analyzed, by the most accurate methods presently available, for nitrogen, oxygen, ozone, carbon monoxide, carbon dioxide, nitrous oxide, methane and water.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0014, ELEMENTARY REACTIONS INVOLVED IN THE UPPER ATMOSPHERE
E.J. BAIR, Indiana University, School of Arts, *Bloomington, Indiana* 47401 (AF-AFOSR-1903-70)

The interaction of the atmospheric environment with AF operations and systems can influence the reliability of methods for detection and communication. In order to assess fully the influence of natural variations (or conceivable perturbations) in this environment, it is necessary to know what chemical species are present, how they are influenced by radiation, and what characteristic reactions occur. In a closely controlled laboratory environment, this research seeks answers to these questions for chemical species characteristic of the upper atmosphere and for those closely related. Current subjects of interest include ozone photolysis with particular emphasis on the reactions of oxygen atoms and ozone with other molecules. Also studied are homologous iso-electronics with oxygen atoms (such as nh or the methylene radical) with a view toward characterizing biradical insertion reactions more generally. In addition, specific consideration is given vibrational energy transfer problems concomitant with energetic reactions of the type being investigated. The primary experimental tool is kinetic spectroscopy following flash photolysis, at high enough spectral resolution to measure populations of molecules in specified energy states and high enough time resolution to deduce the mechanistic origin and fate of these states by an analysis of their kinetic behavior.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0015, ATMOSPHERIC INFLUENCES ON ECOSYSTEMS AND SATELLITE SENSING
M. BAUMGARDNER, Purdue University, Agricultural Experiment Sta., *Lafayette, Indiana* 47907 (IND01727)

Objective: Analyze weather data from surface and satellite observations to aid in planning for remote sensing operations. Develop methods for evaluation and utilization of remotely sensed data pertaining to agricultural ecosystems. Evaluate environmental effects by use of an inter-regional phenological network.

Approach: Purdue will analyze scanner data from ERTSA and ERTSB over Indiana and Midwestern states. All synoptic meterological data available will be analyzed to assist in success of future flights. Emphasis will be placed on the use of multispectral data and computer- oriented pattern recognition techniques. Develop a remote sensing system for studies of Vegetation, Soils, Land Use, and Hydrology. Continue the phenology observations in the north central states and develop a scheme for ground truth acquisition.

Progress: Research continued using imagery from ERTS-1 for more detailed classification of agricultural as well as urban land areas, with impact directed toward more usable long range land utilization of all available land. The definition of the imagery has been good and the resources available in the LARS programs are bringing forth maximum potential for uses by a number of industries and agencies. Areas subject to flooding, silt accumulations as well as water contamination into streams and lakes from industry and natural erosion are detectable and in some instances quantified. Evaluation of imagery at the eighteen locations in the Appalachian and Mississippi corridors continued. Data collected using the LARS system show a decrease in relative reflectance values from maximum color in Autumn to senescence (August 24-November 24, 1973) and an increase in relative reflectance with regrowth in spring as the green vegetation developed. Demonstrated at specific locations in a sequence of passes over the range of stations from Maine to Texas on a given date. Values at some locations where ERTS imagery for specific locations are recorded on successive days show significant variations in relative reflectance. Relative reflectance values used were the average reflectance from four resolution elements. One resolution element for the multi-spectral scanner on ERTS represents an area on the ground of 1.13 acres or approximately 0.5 hectares.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, FLYING TRAINING RESEARCH ON AIRBORNE AND GROUND TRAINING SYSTEMS
H.J. SULLIVAN, Arizona State University, School of Education, *Tempe, Arizona* 85281 (F41609-71-C-0027)

Define instructional variables for incorporation into the design of instructional products for individualized instruction in flying training. Variables to be investigated are affective components, level of student participation, relevant cues and reward-motivation.

A review of the literature in each area will be conducted to identify and analyze pertinent variables. These variables will be used to study relationships, training task and instructional systems factors allowed to vary singly and in selected combinations.

Supporting agency address information: AF Human Resources Laboratory, Ft. Williams AFB, Arizona 85224

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0002, SYSTEMS ANALYSIS OF PHYSIOLOGICAL PERFORMANCE RELATED TO STRESSES SUCH AS THOSE EXPERIENCED IN HIGH PERFORMANCE AIRCRAFT
R.F. WALTERS, Univ. of California, School of Medicine, *Davis, California* 95616 (F44620-72-C-0011)

AF function - AF operations expose personnel to a wide range of temperature variations combined with other stresses such as altitude and maneuvering forces. Varying levels of performance degradation occur as a result of such exposure. Deficiency - ways are needed to predict physiological and performance decrements under the various combinations of stress situations encountered in AF operations. Standards of fitness are lacking. Research - exercise protocals and non-invasive measurement techniques will provide data for validating conditioning regimens leading to satisfactory levels of physical tolerance and to screening and predictive tests for measuring and predicting tolerance of aircrew members. This will involve modeling and experimental phases in which human organ systems are analyzed under simulated or real environmental stresses. How research contributes - the results are in direct support of SAM and AMRL laboratories involved with the technology of protective equipment and setting criteria for environmental control in aircraft.

Supporting agency address information: AF Office of Scientific Research NL, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0003, HYPOTHALAMIC CONTROL OF BODY TEMPERATURE REGULATION
H.T. HAMMEL, Univ. of California, Graduate School, *San Diego, California* 92038 (AF-AFOSR-2531-73)

In the course of worldwide operations, Air Force personnel are exposed to a wide range of environmental stresses. Heat and cold are commonly encountered and result in considerable degradation of performance. Models for prediction of physiological responses and performance changes due to environmental stresses are needed. One important subsystem is the physiological response to heat stress which causes profound cardiovascular and fluid-electrolyte changes. Quantification of inputs to the thermoregulatory centers and prediction of the important physiological outputs are necessary for optimal configuration of Air Force manned systems. The research addressed in this proposal should lead to formulation of a model for evaporative cooling. This effort is in direct support of AMD-TOP-1, Habitable Crew Environments.

Supporting agency address information: AF Office of Scientific Research NL, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0004, VOLUME CONDITIONED STIMULI AFFECTING SALT AND WATER METABOLISM
O.H. GAUER, Freie Universitat Berlin, *Berlin, Federal Republic of Germany* (F44620-71-C-0117)

The idea originally put forward by Prof. Otto Gauer and Dr. James Henry and their collaborators at the 6570th AMRL in the 1950's, that pressure sensors in the left atrium of the heart could influence the excretions of urine from the kidney, has now been well established as one of the ways blood volume is regulated. There are still questions to be answered about the exact chain of events bringing about this regulation, and how salt excretion can be regulated separately from water. The answer to these questions is of great importance in explaining the effects of acceleration on the body and any stressor that effects the return of blood to the heart and thus the distension of the right and left auricles and the great veins. The fact that excretion of water separate from sodium could be an important problem first arose in experiments at the School of Aerospace Medicine (SAM), on men immersed in water to simulate some aspects of weightlessness. The interests of the Air Force are now focused on problems of increased levels of prolonged acceleration and vibration. The role that the heart pressure receptors play in regulatory adjustments to these stresses continues to be highly relevant. Prof. Gauer will visit the USAF-SAM, 6570th AMRL and the University of Kentucky and continue to keep a close liaison between his work, the research at these institutions and Dr. James Henry at USC and Dr. Gupta in India.

Supporting agency address information: AF Office of Scientific Research NL, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0005, ENHANCEMENT OF HUMAN EFFECTIVENESS IN SYSTEM DESIGN, TRAINING, AND OPERATION
S.N. ROSCOE, Univ. of Illinois, School of Engineering, *Urbana, Illinois* 61801 (F44620-70-C-0105)

AF function-this research relates to basic problems of human performance in design, personnel training, and operation of air systems and supports interests of the Flying Training Division of AFHRL and the Human Engineering Division of AMRL. Deficiency-this research is directed toward lowering cost of pilot training by improved selection methods and training procedures and assessment of proficiency. Objective-the following task areas are included: (1) studies of residual attention and information load in relation to pilot performance; (2) research on adaptive logic in acquisition of perceptual-motor skills in flight tasks; (3) completion of programmatic research in synthetic flight training and other human performance variables and measures, and on extending response surface methodology to perceptual research on visual time compression; (4) prepare integrated summary of completed research programs; (5) conduct collaborative interchanges with AF researchers. Approach- this research is interdisciplinary, using pilot-trained researchers, instrumented aircraft, and various simulation equipment. Research problems are drawn from the real world of aviation. Subjects are drawn from students undergoing flying training, and other populations including senior pilots. Collaborative efforts with AF Research groups are undertaken on various problems. Contribution - this research provides AF applied research agencies with methodological and substantive information applicable to the design and operation of aerosystems and training on a cost/effective basis.

Supporting agency address information: AF Office of Scientific Research NL, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0006, NEUROHUMORAL CONTROL MECHANISM IN THE REGULATION OF CARDIOVASCULAR FUNCTION AND FLUID-ELECTROLYTE BALANCE
P.D. GUPTA, Univ. of Delhi, *Delhi, India* (AF-AFOSR-2149-71)

Exposure to increased acceleration in high performance Air Force aircraft, prolonged sitting or standing in one position, and loss of blood causes massive shifts in the blood within the heart and associated large vessels. The physiological consequences can be far reaching and deleterious. This research complements and supplements the work of Drs. Henry and Meehan at the University of Southern California on the mechanisms involved in the control of blood volume and adjustments in circulation, with particular emphasis on the importance of certain sensory nerve fibers and endocrines. The results will be applicable to design criteria of protection devices and maneuvers for augmenting tolerances to certain environmental stresses.

Supporting agency address information: AF Office of Scientific Research NL, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0007, A THERMAL MODEL COMPARISON STUDY
R.S. ELIZONDO, Indiana University, School of Medicine, *Indianapolis, Indiana* 46202 (AF-AFOSR-2473-73)

Air Force function -- aircrews are exposed to high thermal stresses in many of the missions which they must perform. Muscular work produces fatigue and in hot environments can lead to rapid incapacitation. Additionally, thermal stress is known to enhance reduction in tolerance to other stresses such as acceleration with rapid degradation of performance. Deficiency -- physiological knowledge is needed to set rational design criteria for aircraft and personal equipment to reduce the effects of thermal stress. Predictive models of human limitations in multiple stress situations are needed and these must be based to a large extent on reliable animal data. Research -- a series of coordinated experiments will be conducted to further characterize the thermoregulatory system of monkeys. Use of the monkey as a viable model for temperature regulation studies which cannot be performed in man will be evaluated. How research contributes -- with development of a thermoregulatory model, rational approaches can be made to prevent or ameliorate adverse effects of thermal stresses, better understand the basic mechanisms of thermal acclimatization and suggest new methods of adaptation to hot environments. This research is directly applicable to applied programs at USAFSAM and AMRL and is identified under RO 1.5 'Habitable Crew Environments and Toxic Hazards'.

Supporting agency address information: AF Office of Scientific Research NL, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0008, THE INVESTIGATION OF METABOLIC AND CARDIOVASCULAR RESPONSES TO FATIGUING STATIC EFFORT
A.R. LIND, St. Louis University, School of Medicine, *St. Louis, Missouri* 63104 (AF-AFOSR-2362-72)

Fatigue is one of the major causes of reduced aircrew efficiency. Little attention has been paid to the influence of static activity which leads to early muscular fatigue which is cumulative and slow in recovery. Development of aircraft capable of prolonged flight times aggravate the problem - prolongation of the flight increases the total amount of muscular effort and adds other stresses such as lack of sleep/rest and upset biological rhythms. The development of new, faster aircraft will increase the gravitational stresses on pilots. It has been proposed that pilots may overcome this stress by being recumbent while flying. It has been shown that the increase in blood flow to active muscles is lower in the recumbent than in upright postures and muscular endurance thereby is reduced. The possibility that muscular fatigue may be induced more quickly and more slowly dissipated in men when recumbent has obvious ramifications for pilots. This investigation is intended to determine the extent of changes in cardiovascular responses to isometric exercises and to quantify the effects they may have on muscular fatigue and recovery from fatigue when men are in different postures.

Supporting agency address information: AF Office of Scientific Research NL, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0009, BONE STRENGTH AND IN-FLIGHT MECHANICAL STRESSES
G.A. GRAVES, Univ. of Dayton, Graduate School, *Dayton, Ohio* 45409 (F44620-71-C-0083)

The effects of various mechanical stresses on USAF aircrews continue to be a problem. As the average age of aircrew members increases the incidence of spinal injury, non-union fractures and damage to large skeletal areas will increase, due to decreased bone strength, upon exposure to sustained acceleration and in ejection procedures from high performance aircraft. Knowledge of bone metabolism, necrosis, restructuring and associated phenomena becomes of considerable importance to USAFAMD and AMRL research laboratories as well as those USAF medical facilities concerned with treatment and restoration of bone injuries in USAF personnel. This project is a joint effort between the 6570th AMRL and the principal investigator for development and in vivo evaluation of a ceramic bone graft which encourages bone restructuring, and thus facilitates new insight into bone metabolism and related processes. This research supports that part of RN-AMD-12-72-1 dealing with biomechanical behavior of hard tissues in vibration and impact environments and AMD TPO 3 'Mechanical Forces Environments'.

Supporting agency address information: AF Office of Scientific Research NL, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0010, RADIOGRAPHIC AND BIOMECHANICAL STUDIES OF THE HUMAN LUMBAR SPINE
M.H. POPE, Univ. of Vermont, School of Technology, *Burlington, Vermont* 05401 (AF-AFOSR-2738-74)

The Air Force operational environment involves exposure of personnel to a wide range of mechanical forces including vibration, acceleration, deceleration, flail and impact. The musculoskeletal system is severely effected by these forces. Current biomechanical studies supported by AMD Projects 7230 and 7231 address the dynamic properties of isolated spinal segments as well as whole animal subjects. Related work in AMD Project 7184 evaluates mass-moment-of-inertia and center-of-gravity

characteristics of cadavers. Data from these efforts are being used for model formulation describing human spinal response. This effort will apply measured degrees of flexion, extension and rotation to fresh, intact cadaver spines, observe the spinal geometry through biplanar x-rays and determine the dynamic response of the lumbar spine to controlled rates of compressive loading. These data are essential for the required predictor model of human effects.

Supporting agency address information: AF Office of Scientific Research NL, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, ESTIMATION THEORY BASIC TO NAVIGATION AND GUIDANCE SYSTEMS DESIGN

R.S. BUCY, Univ. of Southern California, Graduate School, *Los Angeles, California* 90007 (AF-AFOSR-2141-71)

Fundamental to guidance systems, navigation systems, orbit determination and precision attitude determination is modern estimation theory. Past research by the principal investigator has led to the development of the Kalman-Bucy filter, which has been used in almost every major aerospace system developed in the last few years. Nonlinear theory, however, is applicable to a much wider class of problems and can provide a great improvement over the linear theory. This research program has been dedicated to the investigation of nonlinear estimation with major emphasis on the development of theory which will make optimal nonlinear filters possible. In particular the method of two-dimensional cubic interpolation splines is proposed as a method to carry the conditional density of phase and phase rate in phase demodulation, given the observation. Suboptimal filters obtained using a singular perturbation method will also be studied and evaluated for accuracy, using Monte Carlo simulation. Surface wave devices are being synthesized to perform high speed convolution as required for time signal correlation. Another area of research is that of periodic solutions of matrix Riccati equations. The problem consists of generalizing methods of Bruns for the restricted three body problem, with applications to orbit determination for vehicles in periodic orbits.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

7.0002, NUMERICAL APPROXIMATION TECHNIQUES APPLIED TO GAS DYNAMICS

Y.L. LUKE, Univ. of Missouri, School of Arts, *Kansas City, Missouri* 64110 (AF-AFOSR-2520-73)

It is important to understand the physical phenomena of gas dynamics and aerothermodynamics in the higher flight regimes, in particular to understand the effects of high-energy flow fields on test specimens and flight-vehicle models, and to model and simulate the free- stream velocity, Reynolds number and stagnation enthalpy encountered by hypervelocity reentry vehicles. The appropriate mathematical modeling of these phenomena often involves the formulation and solution of integral equations, employing special functions and contemporary techniques of numerical analysis. The central goal of this research program addresses these latter ends. Specific research directions include the development of approximation methods for the solution of integral equations which characterize rarefied gas flows, the preparation of certain tables of transcendental functions, the study of approximations and inequalities for functions of operator (matrix) argument, for example, the development of asymptotic expansions of a function of matrix argument, the refinement of techniques of gaussian and extended gaussian quadrature including numerical studies to compare error predictions with extant methods, and the extension of some results of recursive computation, in particular to classes of functions which satisfy three and higher term recurrence formulas.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

7.0003, STRUCTURED SOFTWARE

J.D. MCGONAGLE, James P. Anderson & Co., *Fort Washington, Pennsylvania* 19034 (F33615-72-C-1972)

To develop a technique for simplifying the production, test and management of avionics software.

To investigate the methodology of structured programming as applied to avionics software.

Supporting agency address information: AF Avionics Laboratory AAM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

7.0004, RELIABILITY AND OTHER AIR FORCE PROBLEMS INVOLVING FACTORIZATION OF MULTIVARIATE TEST CRITERIA

A.M. KSHIRSAGAR, Texas A & M University System, Graduate School, *College Station, Texas* 77843 (AF-AFOSR-2676-74)

Some important Air Force problems requiring increased statistical analysis are (1) studies of reliability characteristics of components in multicomponent systems in relation to the systems reliability characteristics in situations in which no deterministic relation between system reliability and component reliability is available, (2) the reliability of a signal in relation to engineering characteristics of the communication system and measurement of uncontrollable 'noise' generating factors, (3) test batteries for pilots, navigators, and other personnel for the calculation of 'indices' (discriminant functions) indicating subsequent operational performance, and (4) multiple decision problems. These problems will be analyzed by developing multivariate inference techniques to deal with problems of two or more groups when observations on several intercorrelated characters are available. The problems to be considered include a multivariate analysis of variance and covariance of the data, discrimination among the groups, estimation of parameters associated with the discriminant analysis such as misclassification probabilities and reduction in the dimensionality. As an important special area the proposal deals with problems of analyzing incomplete multivariate data.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

7.0005, OPERATIONAL SOFTWARE CONCEPT

J. ENGELLAND, General Dynamics Corporation, *Fort Worth, Texas* 76101 (F33615-73-C-1209)

The operational software concept has three principal objectives- (1) to develop a design methodology for operational flight software w/a framework that permits efficient re-use of software throughout the life cycle of avionics modifications and efficient transfer of software across different missions with a variety of airborne computer architectures, (2) to evaluate the feasibility of the methodology and framework w/regard to cost and time for development and test, level and ease of modifiability and transferability, and efficiency and reliability of executable code, (3) to determine the design aids, documentation methods, support software tools, and language characteristics required to effectively utilize such a framework in the actual AF development and maintenance environment.

During the first year, avionics information processing tasks will be analyzed in order to determine a software partitioning that permits the separation of computer architecture dependencies, avionics subsystem dependencies, and mission scenario dependencies while maintaining reasonable execution efficiency. The interfacing among the various module types is to facilitate fault isolation, ease of test, and ease of modification. In addition to the basic modular framework, a methodology for design, documentation, production, and test will be incorporated into an operational software structure designer's handbook. During the second year, the methodology and structure will be evaluted by designing, producing, and exercising samples of avionics flight software including executives for two diverse mission-types, each for two dif-

ferent airborne computer architectures. This evaluation will require extensive data gathering during design,test, modification, and operation, and will include fault tolerance analysis. Finally, the design aids, documentation methods, and production tools used will be evaluated in order to specify the support software, modular library structure and language characteristics required to insure easy and profitable use of the operational software structure and methodology by individual SPOS and AMAS.

Supporting agency address information: AF Avionics Laboratory AAM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, REACTION AND PHOTODETACHMENT OF ATMOSPHERIC NEGATIVE IONS

J.T. MOSELEY, Stanford Research Institute, *Menlo Park, California* 94025 (DAHC04-73-C-0016)

To successfully develop BMD systems, it is essential to have extensive knowledge of both the normal and disturbed upper atmosphere and to fully understand the interaction of such environment with the weapon systems. These objectives can be achieved most effectively by (1) measuring those properties of the upper atmosphere that are essential for the development of current and proposed BMD systems, (2) conducting detailed laboratory studies of electron, ion, and molecular interactions that are critical for modeling, and (3) combining the results of the upper atmosphere that accurately and adequately describe and predict the expected high altitude environments for these weapon systems. Section IX of the Army Qualitative Research Requirements for Nuclear Weapons Effects Information (QRR) documents the requirements for this research in connection with the development of Army BMD systems. The QRR was written in response to PARA 1122EE of the Combat Development Objective Guide (CDOG).

Drift tube-mass spectrometer and laser techniques will be used to investigate the photodetachment of electrons from and photodissociation of the negative ions of carbon trioxide and hydrated carbon trioxide over the photon energy range from 2.4 EV to 3.5 EV and to investigate hydration ractions for the negative ion of carbon trioxide. These studies will help determine how many free electrons are created by the light from a bomb. Free electrons are the means by which radar energy is absorbed in an ionized cloud.

Supporting agency address information: AMC Ballistic Research Laboratories, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

8.0002, SPECTROSCOPIC STUDIES OF ENERGY EXCHANGE PROCESSES

H.P. BROIDA, Univ. of California, School of Letters, *Santa Barbara, California* 93106 (AF-AFOSR-1851-70)

To obtain improved electromagnetic signal transmission for communication systems, it is necessary to have a detailed understanding of the chemistry and physics of the upper atmosphere and rocket exhaust plumes. Part of this understanding comes from the study of the kinetics of atomic and molecular collisions of excited chemical species. The objective of this program is to study gas phase kinetics through the use of unique optical spectroscopy techniques developed at the University of California, Santa Barbara. Research is focused on processes involving electronic and vibrationally excited states. Optical spectroscopy from 100 to 20,000 nm is being used to determine mechanisms and to measure rate constants and cross sections for several low energy collision processes and chemiluminescent reactions involving small molecules. Studies in the coming year will include - (a) continued development of new, ultrahigh resolution optical methods for the study of molecules, (b) use of improved laser facilities to measure more accurately the kinetics of room temperature metal atom reactions with oxidants and halogens, and (c) use of laser induced photoluminescence to measure spectroscopic constants of other simple molecular species which are of atmospheric, combustion, and chemical laser interest.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0003, OPTICAL INTERFEROMETERS APPLIED TO THE DIAGNOSTICS OF PLASMA

J.G. HIRSCHBERG, Univ. of Miami, Graduate School, *Miami, Florida* 33149 (AF-AFOSR-2198-72)

Surveillance, reconnaissance and electromagnetic detection in next- generation vehicles will employ support technologies in upper atmospheric and space environments as well as EM propagation in ionized plasmas. Interferometric optical research will provide composition data of charged and neutral species and long and short term radiative interaction criteria to improve reliability and increase detection sensitivity. This research applies optical interferometer techniques to plasma diagnostics through four principal methods. (1) A multi-channel Fabry-Perot interferometer, to study the shape and breadth of rapidly changing spectral lines, is in operation and will be used on the TRISOPS plasma device. It is equipped to allow direct data reduction by digital computer. (2) The Fabry-Perot duochrometer, adapted to measure extremely small shifts in wavelength, will be used on the helios medium energy, high density plasma device. (3) Plasma interferometry with CO2 laser pulses will improve density measurements in both time and accuracy. (4) Highly ionized plasmas will be analyzed in a new device, including highly ionized species not available for detailed study under any present research technique.

Supporting agency address information: AF Office of Scientific Research NPP, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0004, EFFECTS OF FORCED CONVECTION AND MAGNETIC FIELDS ON STEADY- AND NON-STEADY CROSS-FLOW AND CO-AXIAL ARC PLASMAS

D.M. BENENSON, State University of New York, School of Arts, *Albany, New York* 12224 (AF-AFOSR-1928-70)

Advanced efficient plasmadynamic devices (e.g., electric propulsion engines, high intensity light sources, laser power packages, power generators, arc heaters) are required for satellite surveillance, airborne and ground base maintenance and equipment testing (e.g., MHD plasma and high enthalpy tunnels). This research encompasses study of forced convection (e.g., turbulence, swirl) and magnetic field interaction with steady-state and pulsed arc plasmas, and applications of new plasma diagnostics and methodologies. Results will aid in understanding the complex mechanisms and physical processes involved, in reducing plasma-interaction power losses, in improving limited performance, and in engineering design and development of these advanced plasmadynamic systems. Experiments will be conducted in sub- and atmospheric seeded and unseeded gases (e.g., noble gases, nitrogen, etc.) over wide ranges of operating parameters (e.g., velocity, current, electrode spacing, magnetic field strength, mass flow rates). (1) The extent of equilibrium within pulsed co-axial and steady-state (pointed and rail electrode) cross-flow arc, and time varying rail and annular cross flow arcs, and (2) temperature distribution, cross-sectional shape, arc profile, current flow and stability, and arc extinction criteria therein will be determined. The influence of turbulence will be studied. Gas and electrode temperature, electron-number density and velocity distributions will be obtained for the seeded plasmas. Spectroscopic and other diagnostic techniques will be used to observe and analyze the plasma phenonema. Realistic analytical phenomenological models, incorporating the coupled gas dynamic, magnetic, electrodynamic and thermodynamic effects, will be formulated for balanced and deflected steady-state and pulsed cross-flow plasmas and compared with experimental results.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0005, ATOMIC BEAM SCATTERING STUDIES 10665-P
B. BEDERSON, New York University, School of Arts, *New York, New York* 10003 (DA-ARO(D)-31-124-73-G20)

To contribute to reliable measurements of electron-atom and electron-molecule scattering cross sections in order to provide basic information about scattering processes. Data which will be produced during the course of this research will permit calculations on upper atmospheric phenomena directly related to long range military communications and ballistic missile defense in a nuclear environment.

Experimental work will include- (1) measurement of atomic and molecular polarizabilities, (2) performance of electron-atom collision experiments with spin analysis, and (3) perfect a 'universal' technique for measuring total electron atom and electron-molecule collision cross sections using atomic beam recoils.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

8.0006, EXCITATION AND IONIZATION PROCESSES BY ELECTRON IMPACT
E.N. LASSETTRE, Carnegie Mellon University, Graduate School, *Pittsburgh, Pennsylvania* 15213 (AF-AFOSR-2244-72)

In order to predict the infra-red background produced in a nuclear burst it is necessary to know radiative lifetimes and oscillator strengths of atmospheric diatomic molecules. This research will employ an electron spectrometer of exceptional flexibility with provision for the study of lifetimes in radiative emission of gases excited by electron impact. Energy analysis of the scattered electrons, and a coincidence circuit to operate a fast photomultiplier in conjunction with a multiplier at the exit to the scattered electron analyzer, will permit the measurement of lifetimes with the effects of cascading eliminated. Independent determinations of oscillator strengths, by electron impact methods, will also be done and ionization processes studied by coincidence counting.

Supporting agency address information: AF Office of Scientific Research NPP, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0007, ATOMIC AND MOLECULAR PROCESSES IN ATMOSPHERIC ENVIRONMENTS 11427-P
J.N. BARDSLEY, Univ. of Pittsburgh, School of Arts, *Pittsburgh, Pennsylvania* 15213 (DAHC04-73-C-0037)

To study penning ionization and dissociative recombination. Optics, plume physics phenomena of ARPA interest, such as reentry, nuclear blackout, exhaust plumes, etc., involve a whole host of quantities which presently can neither be measured nor calculated, but which might become calculable as a result of these theoretical investigations.

Investigate the feasibility of ab initio calculations on dissociative recombination, penning ionization, and associative ionization. Each of these processes involves autoionizating states, and the major calculational problem is the determination of the potential curves and decay rates of these states.

Supporting agency address information: AMC Army Research Office ARO-D, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

8.0008, ATOMIC COLLISIONS AND PLASMA PHYSICS 11166-P
M.A. BIONDI, Univ. of Pittsburgh, School of Arts, *Pittsburgh, Pennsylvania* 15213 (DA-ARO(D)-31-124-73-G79)

To advance the understanding of ion-electron recombination rates of atmospheric species, atmospheric ion-molecule reaction rates and mechanism of electron-ion recombination. This research is directly relevant to the ballistic missile defense work at BRL, and has the potential for contributing parameters for studies of laser propagation in the atmosphere.

Research will consist of- (a) measurements of electron-ion recombination rates under conditions duplicating the normal and artificially perturbed ionosphere, (b) measurements of ion-molecule reaction rates which affect the identities and concentrations of positive and negative ions in the various ionospheric regions, again for normal and perturbed conditions, and (c) studies of the basic mechanisms of electron capture by positive ions to provide improved understanding of basic processes, guidance for theoretical calculations, and new measurement techniques.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

8.0009, ATOMIC AND MOLEULAR PROCESSES IN ATMOSPHERIC ENVIRONMENTS 11427-P
M.A. BIONDI, Univ. of Pittsburgh, School of Arts, *Pittsburgh, Pennsylvania* 15213 (DAHC04-73-C-0037)

To study energy partitioning in metal atom chemi-excitation. Fundamental understanding of the partitioning of translational, rotational, virbrational, and electronic energy among the products of exothermic reactions is necessary in the optics program in the interpretation of chemiluminescent radiation in the natural atmosphere, especially in auroras. Information on linebroadening in chemi-excitation is also required in the IVY-OWL program to characterize the optical depth of metal atom radiation under post-nuclear burst conditions.

The translational energy release in excitation process leading to electronically excited metal atoms will be investigated by Fabry-Perot interferometry. Information will be obtained regarding the identity of excitation precursor species by quantitative quenching experiments. Experimental work will be done on sodium d-line excitation reactions involving N, O, and H-atoms and some excited molecular species, as well as on equivalent processes in lithium or in molecular excited states of very short radiative lifetime such that their radiative transitions occur before they undergo collisional energy transfer.

Supporting agency address information: AMC Army Research Office ARO-D, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

8.0010, ATOMIC AND MOLECULAR PROCESSES IN ATMOSPHERIC ENVIRONMENTS 11427-P
W.L. FITE, Univ. of Pittsburgh, School of Arts, *Pittsburgh, Pennsylvania* 15213 (DAHC04-73-C-0037)

To study the reactions of metal atoms with ions in magnetically confined afterglow. The reactions relate to the chemistry of metals in the upper atmosphere occurring there either naturally, via meteorite showers, or artificially through a nuclear disturbance. The nature of the products affects both the electron chemistry and infra-red background, since the molecular products are IR radiators in general.

The program will study the charge transfer and ion-atom reactions between atmospheric ions and metal atoms. Experiments will concentrate on shaping of the magnetic field to permit accurate determination of absolute cross sections of the observed reactions. Efforts will also be made to determine absolute reaction cross sections and the experiments will be extended to include uranium atom targets.

Supporting agency address information: AMC Army Research Office ARO-D, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, THE ALASKA MERIDIAN CHAIN OF ALL-SKY CAMERA STATIONS
S. AKASOFU, Univ. of Alaska, Geophysical Institute, *College, Alaska* 99735

A close array of all-sky camera and magnetometer stations along the Alaska geomagnetic meridian has been successfully operated during two winter seasons. The all-sky data for the first season have already been extensively studied in conjunction with the TRIAD satellite, the interplanetary magnetic field, the ISIS-2 auroral scanner, the Chatanika radar and DAPP satellite data. The results show that such an array of observatories is essential

for the study of magnetospheric substorm processes. The Alaska meridian chain of stations will be operated during the winter periods of 1975-76 and 1976-77 as a part of the IMS programs.

SUPPORTED BY U.S. Natl. Science Foundation

10.0002, RESEARCH IN RADIATION PHYSICS AND AERODYNAMICS- IONOSPHERIC PHYSICS 10757-P

H.G. BOOKER, Univ. of California, School of Engineering, *San Diego, California* 92038 (DAHC04-72-C-0037)

To increase the understanding of ionospheric physics. The Institute for Pure and Applied Science at the University of California (San Diego), is an inter-disciplinary group of scientists carrying out experimental and theoretical research related to defense aspects of gas physics, plasma phenomena, and turbulent flows. Research in lasers with a potential for diagnostics and weapon applications is also included. The major applications for this research to strategic technology are reentry discrimination and countermeasures, laser techniques and applications and ionospheric plasma dynamics (OHD).

Theoretical analysis related to an ionospheric heating experiment in which a high power radio wave transmitter was used to modify the ionosphere shall be performed. The study shall analyze the plasma instabilities postulated as being responsible for the resulting effects.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

10.0003, AN INVESTIGATION OF HIGH LATITUDE IONOSPHERIC ABSORPTION

H.J. CHIVERS, Univ. of California, Graduate School, *San Diego, California* 92038

The investigation of the absorption of extraterrestrial electromagnetic radio waves by the ionosphere at high and medium latitudes will continue at Siple and along the Alaskan riometer chain, and the installation of a conjugate riometer near Roberval will be considered. Analysis will continue to concentrate on the relationship of ground based absorption measurements and proton flux measured by deep space probes. The time course data from the northern riometer chain is being analyzed to study the latitudinal development of absorption during a magnetospheric substorm. Results to date point to the need for a very narrow beam antenna system capable of measuring the morphology and motion of intense ionization patches. To this end two antenna designs (coaxial with alternating inner core to shield connections and dipoles connected in anti-phase) are being investigated as candidates. Data collection will be improved by a new magnetic tape recording system which will record digital data ten times per second, and the range in which sensitive measurements can be made will be expended by abetting the 30 MHz riometer with a lower and higher frequency instrument. Additional analysis will compare simultaneous data collected by the Siple riometer, fluxgate magnetometer and search coil magnetometer in a theoretical search for the relationship between the various measurements.

SUPPORTED BY U.S. Natl. Science Foundation

10.0004, RESEARCH IN RADIATION PHYSICS AND AERODYNAMICS- TURBULENT MIXING AND SHEAR FLOWS 10757-

C.H. GIBSON, Univ. of California, Graduate School, *San Diego, California* 92038 (DAHC04-72-C-0037)

To increase the understanding of turbulent mixing and shear flows. The Institute for Pure and Applied Science at the University of California (San Diego), is an inter-disciplinary group of scientists carrying out experimental and theoretical research related to defense aspects of gas physics, plasma phenomena, and turbulent flows. Research in lasers with a potential for diagnostics and weapon applications is also included. The major applications for this research to strategic technology are reentry discrimination and countermeasures, laser techniques and applications and ionospheric plasma dynamics (OHD).

Basic studies of turbulent mixing and shear flows shall be performed.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

10.0005, INVESTIGATIONS OF COSMIC RAY INTENSITY VARIATIONS IN ANTARCTICA

M.A. POMERANTZ, Franklin Inst. of State of Pa., *Swarthmore, Pennsylvania* 19081

Neutron monitors and meson telescope will be operated at McMurdo to collect data which can be interpreted in terms of the flux and spectra of the galactic cosmic radiation and the effect which periodic and aperiodic variations have on this radiation. The rationale for this type of measurement in the polar regions lies in the fact that the high count rate at polar stations provides exceedingly high resolution and, therefore, accuracy in the study of anisotropies and other manifestations of the dynamic behavior of cosmic rays. The short time resolution at the polar stations will be used to provide information about solar modulation and complex flare development which will be used to gain information about convection, diffusion, and, at low energies, acceleration processes in the heliosphere which, ultimately, affect the near earth environment. Intensity variations which have periods ranging from minutes to two solar cycles will be studied to learn about the basic physics of the sun and of the solar wind plasma. Specific topics which will be studied include interplanetary acceleration, solar particle anisotropy, propagation and acceleration mechanisms, and the north-south asymmetry. Since simultaneous world-wide observations are paramount to investigations of this type, data sharing will continue with research groups in more than 20 countries.

SUPPORTED BY U.S. Natl. Science Foundation

VOLUME 13 NUMBER 4 / FEBRUARY 23, 1975

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N75-12892*+ National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A SPECIAL BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 46, JULY 1974
Jul. 1974 102 p
(NASA-SP-7037(46)) Avail: NTIS HC $4.00 CSCL 01A

This special bibliography lists 374 reports, articles, and other documents introduced into the NASA scientific and technical information system in June 1974. Author

N75-12893*# Boston Univ., Mass. College of Engineering.
A GENERAL THEORY OF UNSTEADY COMPRESSIBLE POTENTIAL AERODYNAMICS
Luigi Morino Washington NASA Dec. 1974 201 p refs Supersedes TR-72-01
(Grant NGR-22-004-030)
(NASA-CR-2464; TR-73-01; TR-72-01) Avail: NTIS HC $7.25 CSCL 01A

The general theory of potential aerodynamic flow around a lifting body having arbitrary shape and motion is presented. By using the Green function method, an integral representation for the potential is obtained for both supersonic and subsonic flow. Under small perturbation assumption, the potential at any point, P, in the field depends only upon the values of the potential and its normal derivative on the surface, sigma, of the body. Hence, if the point P approaches the surface of the body, the representation reduces to an integro-differential equation relating the potential and its normal derivative (which is known from the boundary conditions) on the surface sigma. For the important practical case of small harmonic oscillation around a rest position, the equation reduces to a two-dimensional Fredholm integral equation of second-type. It is shown that this equation reduces properly to the lifting surface theories as well as other classical mathematical formulas. The question of uniqueness is examined and it is shown that, for thin wings, the operator becomes singular as the thickness approaches zero. This fact may yield numerical problems for very thin wings. Author

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N75-12894 Massachusetts Univ., Amherst.
A METHOD FOR DETERMINING THE EFFECTS OF RAPID INFLOW CHANGES ON THE DYNAMICS OF AN AUTOROTATING ROTOR Ph.D. Thesis
Eugene Everett Niemi, Jr. 1974 199 p
Avail: Univ. Microfilms Order No. 74-25931

The equations of motion are derived for the blade flapping that occurs when a helicopter or gyroplane rotor is operating in autorotation. These equations account for wide variations in rotor rpm and a pitching rotor shaft. The equations are programmed for numerical solution with a digital computer. The validity of the equations is demonstrated by numerous comparisons of the theory with published experimental data for rotor blade flapping motion and angular velocity variations. Experiments are described in which a 3 ft. diameter rotor model was tested in autorotation in a wind tunnel. The equations are used to predict the rotor blade flapping motion and autorotation rpm that occur. The agreement between theory and experiments is found to be generally fair to good. Dissert. Abstr.

N75-12895 Pennsylvania State Univ., University Park.
THE VORTEX LATTICE METHOD FOR THE ROTOR-VORTEX INTERACTION PROBLEM Ph.D. Thesis
Raghuveera Padakannaya 1973 141 p
Avail: Univ. Microfilms Order No. 74-20956

The rotor blade-vortex interaction problem and the resulting impulsive airloads which generate undesirable noise levels are dealt with. A numerical lifting surface method to predict unsteady aerodynamic forces induced on a finite aspect ratio rectangular wing by a straight, free vortex placed at an arbitrary angle in a subsonic incompressible free stream is developed first. In this vortex lattice method both the spanwise and the chordwise loadings are made stepwise discontinuous. Unsteady airloads on the wing are obtained by starting the system from rest. Using a rigid wake assumption, the wake vortices are assumed to move downstream with the free stream velocity. Unsteady load distributions are obtained which compare favorably with the results of planar lifting surface theory. The vortex lattice method was extended to a single bladed rotor operating at high advance ratios and encountering a free vortex from a fixed wing upstream of the rotor. Dissert. Abstr.

N75-12896*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MEASUREMENTS OF THE VORTEX WAKES OF A SUBSONIC AND SUPERSONIC TRANSPORT MODEL IN THE 40 BY 80 FOOT WIND TUNNEL
V. J. Rossow, V. R. Corsiglia, and J. J. Phillippe (ONERA) Sep. 1974 19 p refs
(NASA-TM-X-62391) Avail: NTIS HC $3.25 CSCL 01B

The rolling moment induced on aircraft models in the wake of a model of a subsonic transport and of a supersonic transport was measured as a function of angle of attack for several configurations. The tests are described and an analysis of the data is given in this memorandum. Author

N75-12897*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EXPERIMENTAL AERODYNAMIC CHARACTERISTICS FOR A CYLINDRICAL BODY OF REVOLUTION WITH VARIOUS NOSES AT ANGLES OF ATTACK FROM 0 DEG TO 58 DEG AND MACH NUMBERS FROM 0.6 TO 2.0
Leland H. Jorgensen and Edgar R. Nelson Washington Dec.

1974 90 p refs Prepared in cooperation with ARO, Inc., Moffett Field, Calif.
(NASA-TM-X-3128; A-5746) Avail: NTIS HC $4.75 CSCL 01A

An experimental investigation was conducted to determine the effect of forebody geometry, a grit ring around the nose, Reynolds number, Mach number, and angle of attack on the aerodynamic characteristics of a body of revolution. Aerodynamic force and moment characteristics were measured for a cylindrical body with tangent ogive noses of fineness ratio 2.5, 3.0, 3.5, and 5.0. The cylindrical body was tested with an ogive nose having a rounded tip and an ogive nose with two different nose strake arrangements. Aerodynamic configurations were tested at various Mach numbers, angles of attack, and Reynolds numbers. The data demonstrate that the aerodynamic characteristics for a body of revolution can be significantly affected by changes in nose fineness ratio, nose bluntness, Reynolds number, Mach number, and, of course, angle of attack. Nose strakes increased the normal forces but had little effect on the side forces that developed at subsonic Mach numbers for alpha greater than about 25. A grit ring around the nose had little or no effect on the aerodynamic characteristics. Author

N75-12898*# Kansas Univ., Lawrence. Flight Research Lab.
AN ANALYTICAL INVESTIGATION OF WING-JET INTERACTION
C. Edward Lan [1974] 158 p refs
(Grant NGR-17-002-107)
(NASA-CR-138140; CRINC-FRL-74-001) Avail: NTIS HC $6.25 CSCL 01B

The aerodynamic interaction between the wing and an inviscid jet with Mach number nonuniformity is formulated by using a two-vortex-sheet model for the jet. One of the vortex sheets accounts for the induced jet flow and the other the induced outer flow. No additional source distribution is needed for the jet at an angle of attack. The above problem is solved by satisfying the jet and wing tangency and the jet pressure-continuity conditions and using a quasi vortex lattice method for computing the induced flow field. The latter method is derived through theoretical consideration by properly accounting for singularities present in the equations and possesses the same simplicity and generality as the conventional vortex lattice method but has a better rate of numerical convergence. The resulting system of algebraic equations is solved by Purcell's vector method. The numerical formulation is first applied to the wing-slipstream interaction problem. Results for one centered-jet configuration are compared with those predicted by some existing theories. Author

N75-12899*# Tennessee Univ. Space Inst., Tullahoma.
NUMERICAL SOLUTION FOR UNSTEADY SONIC FLOW OVER THIN WINGS Final Report
K. R. Kimble and J. M. Wu Aug. 1974 35 p refs
(Grant NGR-43-001-102)
(NASA-CR-141114) Avail: NTIS HC $3.75 CSCL 01B

A numerical solution precedure of a simplified unsteady transonic equation which is fast, reasonably accurate, and takes into account many of the effects of the steady flow field is described. The numeric solution of this equation is accurate and is accomplished on an IBM 360/65 computer. Arbitrary planform shape is accommodated and variable local Mach number effects from the steady flow are easily handled. Author

N75-12900*# National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
AERODYNAMIC DRAG REDUCTION TESTS ON A FULL-SCALE TRACTOR-TRAILER COMBINATION WITH SEVERAL ADD-ON DEVICES
Lawrence C. Montoya and Louis L. Steers Dec. 1974 26 p refs Presented at the Reduction of Aerodynamic Drag of Trucks Conf., Pasadena, Calif., 10-11 Oct. 1974 Sponsored in part by POT
(NASA-TM-X-56028) Avail: NTIS HC $3.75 CSCL 13F

Aerodynamic drag tests were performed on a conventional cab-over-engine tractor with a 45-foot trailer and five commercially available or potentially available add-on devices using the coast-down method. The tests ranged in velocity from approximately 30 miles per hour to 65 miles per hour and included some flow visualization. A smooth, level runway at Edwards Air Force Base was used for the tests, and deceleration measurements were taken with both accelerometers and stopwatches. An evaluation of the drag reduction results obtained with each of the five add-on devices is presented. Author

N75-12901*# Kanner (Leo) Associates, Redwood City, Calif.
INVESTIGATION OF THE INFLUENCE OF VORTEX GENERATORS ON TURBULENT BOUNDARY LAYER SEPARATION
V. M. Gadetskiy, Ya. M. Serebriyskiy, and V. M. Fomin Washington NASA Dec. 1974 10 p refs Transl. into ENGLISH from Uch. Zap. (USSR), v. 3, no. 4, 1972 p 22-28
(Contract NASw-2481)
(NASA-TT-F-16056) Avail: NTIS HC $3.25 CSCL 01B

The influence of a parallel system and a diffusor type system of vortex generators on the position of the shock waves on the airfoil profile is studied experimentally. A parallel system of vortex generators is mounted at an angle of 20 deg to the oncoming flow and a system of diffusors is mounted pairwise on the airfoil. Data showing the superiority of the parallel system over the diffusor system are presented. Author

N75-12902*# Scientific Translation Service, Santa Barbara, Calif.
FLIGHT TESTS IN THE WIND TUNNEL FOR THE DEVELOPMENT AND TESTING OF A GUST ALLEVIATION SYSTEM
Bernd Krag and Henning Subke Washington NASA 23 Dec. 1974 10 p ref Transl. into ENGLISH from the German report
(Contract NASw-2483)
(NASA-TT-F-16079) Avail: NTIS HC $3.25 CSCL 01B

The development and characteristics of a free flight, elastic controlled configured vehicle (CCV) wind tunnel model are discussed. The CCV model is used to determine aircraft responses and controller responses to gust simulations. The model represents a compromise between computer simulation and actual flight tests. The advantages of the procedure are analyzed. Author

N75-12903*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
HELICOPTER ROTOR ROTATIONAL NOISE PREDICTIONS BASED ON MEASURED HIGH-FREQUENCY BLADE LOADS
Robert N. Hosier (Army Air Mobility R and D Lab., Hampton, Va.) and Ramani Ramakrishnan (George Washington Univ.) Washington Dec. 1974 86 p refs
(NASA-TN-D-7624; L-9358) Avail: NTIS HC $4.75 CSCL 01B

In tests conducted at the Langley helicopter rotor test facility, simultaneous measurements of up to 200 harmonics of the fluctuating aerodynamic blade surface pressures and far-field radiated noise were made on a full-scale nontranslating rotor system. After their characteristics were determined, the measured blade surface pressures were converted to loading coefficients and used in an existing theory to predict the far-field rotational noise. A comparison of the calculated and measured noise shows generally good agreement up to 300 to 600 Hz, depending on the discreteness of the loading spectrum. Specific attention is given to the effects of the blade loading coefficients, chordwise loading distributions, blade loading phases, and observer azimuthal position on the calculations. Author

N75-12904*# Boeing Vertol Co., Philadelphia, Pa.
INVESTIGATION OF ROTOR BLADE ELEMENT AIRLOADS FOR A TEETERING ROTOR IN THE BLADE STALL REGIME
L. U. Dadone and T. Fukushima Sep. 1974 113 p refs Sponsored in part by Army Air Mobility R and D Lab., Moffett Field, Calif.
(Contract NAS2-7229)
(NASA-CR-137534; D210-10792-1) Avail: NTIS HC $5.25 CSCL 01B

A model of a teetering rotor was tested in a low speed wind tunnel. Blade element airloads measured on an articulated model rotor were compared with the teetering rotor and showed that the teetering rotor is subjected to less extensive flow separation. Retreating blade stall was studied. Results show that stall, under the influence of unsteady aerodynamic effects, consists of four separate stall events, each associated with a vortex shed

from the leading edge and sweeping over the upper surface of the rotor blade. Current rotor performance prediction methodology was evaluated through computer simulation. Author

N75-12905*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EXPERIMENTAL STUDY OF THE EFFECTIVENESS OF CYLINDRICAL PLUME SIMULATORS FOR PREDICTING JET-ON BOATTAIL DRAG AT MACH NUMBERS UP TO 1.30
David E. Reubush Washington Nov. 1974 158 p refs
(NASA-TN-D-7795; L-9746) Avail: NTIS HC $6.25 CSCL 01B

An investigation has been conducted in a 16-foot transonic tunnel to determine the effectiveness of utilizing solid circular cylinders to simulate the jet exhaust plume for a series of eight nacelle-mounted isolated circular-arc afterbodies. This investigation was conducted at Mach numbers from 0.40 to 1.30 at an angle of attack of 0. Plume simulators with simulator diameter to nozzle-exit diameter ratios of 0.82, 0.88, 0.98, and 1.00 were investigated. Results of this investigation indicate that use of one of the larger diameter simulators at all Mach numbers would generally result in pressure-coefficient distributions and drag coefficients useful for preliminary design work. Author

N75-12906*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
APPLICATION OF A PARAMETER IDENTIFICATION TECHNIQUE TO A HINGELESS HELICOPTER ROTOR
Gerd Kanning and James C. Biggers Washington Dec. 1974 68 p refs
(NASA-TN-D-7834; A-5289) Avail: NTIS HC $4.25 CSCL 01B

A mathematical model of a gyro-controlled, three-bladed hingeless helicopter rotor was developed and parameters of the model were estimated using a parameter identification technique. The flapping and feathering degrees of freedom of the blades were modeled. The equations of the model contain time-varying, periodic coefficients due to the forward speed of the rotor. A digital simulation of the analytical model was compared with wind-tunnel measurements to establish the validity of the model. Comparisons of steady-state and transient solutions of the analytical model with the tunnel measurements gave reasonably good matching of gyro angle but less satisfactory matching of hub moment measurements. Further improvements were obtained by use of a parameter identification technique to adjust as many as 10 parameters of the analytical model. The sensitivity of the blade response to small changes in the parameters was also calculated. Author

N75-12907# United Aircraft Corp., Stratford, Conn. Sikorsky Aircraft Div.
THE 3000-HP ROLLER GEAR TRANSMISSION DEVELOPMENT PROGRAM. VOLUME 4: LABORATORY BENCH TEST Final Report
G. F. Gardner and R. E. Haven May 1974 433 p
(Contract DAAJ02-69-C-0042; DA Proj. 1G1-62203-D-144) (AD-785575; SER-611622-Vol-4; USAAMRDL-TR-73-98D) Avail: NTIS CSCL 01/3

The report presents the results of dynamic load tests performed on a turbine powered helicopter transmission which incorporates a roller gear drive unit as the main reduction stage. The primary purpose of this program was to conduct a 200-hour endurance test at 100% design speed and at a load spectrum equivalent to military helicopter usage. (Modified author abstract) GRA

N75-12908# TRW Systems Group, Redondo Beach, Calif.
FINAL DESIGN OF AN AT-GRADE GUIDEWAY FOR THE TRACKED AIR CUSHION RESEARCH VEHICLE Final Report, May - Nov. 1973
Donald D. Magura, William J. Cichanski, and Stephen G. Meisenholder Nov. 1973 144 p refs
(Contract DOT-TSC-442)
(PB-234814/2; TRW-96030-L014-0; FRA-ORD/D-74-50) Avail: NTIS HC $5.75 CSCL 13F

This report describes the final design for an at-grade guideway for the 300 mph Tracked Air Cushion Research Vehicle (TACRV). Detailed drawings and specifications have been developed for this design. Present plans are to extend the presently constructed 3 miles of guideway design for the next construction segment. Reductions in the structural cost of the guidway of 20-30% have been predicted. The guideway described in this report uses a continuously reinforced concrete pavement slab for the horizontal leviation surface and precast concrete panels for the vertical guidance surface. The guidance panels are attached to the slab by steel I-beams. This report summarizes the design features, design constraints, critical loads and cost estimates for this guideway structure. Also described are construction considerations and requirements for the foundation. Theoretical models and the results of the static and dynamic analyses are described in appendices. GRA

N75-12909# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
INVESTIGATION INTO THE FORMATION OF WING-TIP VORTICES Interim Report
J. Rom, H. Portnoy, and C. Zorea Feb. 1974 44 p refs
(Grant AF-AFOSR-2145-71; AF Proj. 9781)
(AD-783271; TAE-199; AFOSR-74-1288TR; SR-2) Avail: NTIS CSCL 01/1

A resume of the program of theoretical investigations into wing-tip vortex formation which is now in progress in the Department of Aeronautical Engineering at the Technion, Haifa, is given. The work is proceeding along two separate paths which it is hoped eventually to amalgamate. The first investigation consists of numerical work on the rolling up of the wing trailing vortex system when it is represented by discrete vortices according to a series of models of increasing complexity starting from the two-dimensional elliptic distribution as originally treated by Westwater and proceeding by stages through various lifting-line and lifting-surface models, including some exhibiting non-linear lift characteristics. The second project is a detailed investigation of the flow field near wing tips and wake edges, including thickness effects. It is felt that the precise flow field near wing tips and the wake edges must be understood if the rolling up and structure of the trailing-vortex cores is to be properly studied.
Author (GRA)

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

N75-12910# International Civil Aviation Organization, Montreal (Quebec).
ACCIDENT INVESTIGATION AND PREVENTION DIVISIONAL MEETING
24 Jun. 1974 95 p Meeting held at Montreal, 3-24 Jun. 1974
(Doc-9106-AIG(1974)) Avail: NTIS HC $4.75

Various aspects of aircraft accident investigation are summarized including accident reports, inquiries, investigation techniques, and financial viewpoints. The role of flight recorders is discussed. The procedures for handling radioactive materials after a crash are enumerated. Rules and regulations for investigating U.S. aircraft that have crashed on foreign territories are also considered. J.A.M.

N75-12911*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
NEW DESIGN AND OPERATING TECHNIQUES AND REQUIREMENTS FOR IMPROVED AIRCRAFT TERMINAL AREA OPERATIONS
John P. Reeder, Robert T. Taylor, and Thomas M. Walsh Dec. 1974 71 p refs Presented at the SAE Air Transportation Meeting, Dallas, 30 Apr. - 2 May 1974
(NASA-TM-X-72006) Avail: NTIS HC $4.25 CSCL 01C

Current aircraft operating problems that must be alleviated for future high-density terminal areas are safety, dependence on

weather, congestion, energy conservation, noise, and atmospheric pollution. The Microwave Landing System (MLS) under development by FAA provides increased capabilities over the current ILS. The development of the airborne system's capability to take maximum advantage of the MLS capabilities in order to solve terminal area problems are discussed. A major limiting factor in longitudinal spacing for capacity increase is the trailing vortex hazard. Promising methods for causing early dissipation of the vortices were explored. Flight procedures for avoiding the hazard were investigated. Terminal configured vehicles and their flight test development are discussed. Author

N75-12912*# Scientific Translation Service, Santa Barbara, Calif.
AIR TRANSPORTATION: GOOD AND BAD USES
M. Wolkowitsch Washington NASA 17 Dec. 1974 19 p Transl. into ENGLISH from Rev. Gen.de l'Air et de l'Espace (France), v. 37, no. 1, 1974 p 7-17
(Contract NASw-2483)
(NASA-TT-F-16067) Avail: NTIS HC $3.25 CSCL 05C

Air transportation and its growth problems were studied. It was recommended that: (1) plans for expanding air services to remoter regions and for short haul purposes be reconsidered; (2) the quality of air service for those routes where its advantages over other means of transport are undeniable be improved, and (3) the proliferation of air service be restrained where its existence is not absolutely necessary and where the development or improvement of rail transportation, for example, would be more sane and economical. Author

N75-12913# McDonnell-Douglas Electronics Co., St. Charles, Mo.
COLLISION AVOIDANCE GROUND STATION ANALYSIS Final Report, Sep. - Dec. 1973
John L. Mohr Mar. 1974 73 p refs
(Contract DOT-FA73WA-3239)
(AD-786683; FAA-RD-74-44) Avail: NTIS HC $4.75

An analysis of three different collision avoidance systems was conducted. The analysis involved the following: (1) ground station clock requirements, (2) Loran-C accuracy and comparisons, and (3) collision avoidance system monitoring requirements. Cesium beam standards are evaluated to determine the time accuracy, and the number required to attain and maintain time to within 0.5 microseconds. The Loran-C system is reviewed to determine the potential time accuracy attainable by monitoring the Loran-C transmission. The results are then compared to the accuracy attainable from satellite, television, WWV and WWVB time transfer. Author

N75-12914# Sandia Labs., Albuquerque, N.Mex.
QUANTITATIVE CHARACTERIZATION OF THE ENVIRONMENT EXPERIENCED BY CARGO IN AIRCRAFT ACCIDENTS
R. K. Clarke, J. T. Foley, W. F. Hartman, and D. W. Larson [1974] 7 p refs Presented at 4th Intern. Symp. on Packaging and Transportation of Radioact. Materials, Miami Beach, Fla., 22 Sep. 1974 Sponsored by AEC
(SLA-74-5372; Conf-740901-8) Avail: NTIS HC $3.25

Relative to surface transportation modes, the frequency of occurrence of cargo aircraft accidents is about two orders of magnitude less on a mileage basis. These accidents tend to be much more severe when they do occur, however, and the purpose of the study is to determine how frequently the environments of the various severities can be expected. The type of environments, the parameters used to describe the several environments, and the general analytical method employed to arrive at these descriptions are those described in the previous paper.
Author (NSA)

N75-12915# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.
AIRCRAFT ACCIDENT REPORT. TRANS WORLD AIRLINES, INC., BOEING 707-331B, N8705T, LOS ANGELES, CALIFORNIA, 28 AUGUST 1973
10 Jul. 1974 48 p
(PB-234422/4; NTSB-AAR-74-8) Avail: NTIS HC $3.75

A Trans World Airlines, Inc., Boeing 707-331B porpoised while descending approximately 35 miles west of Los Angeles, California, at 2150 p.d.t. on August 28, 1973. The flight was bound for the Los Angeles International Airport. The longitudinal instability persisted for about 2 minutes during which more than 50 pitch oscillations occurred. Peak acceleration forces at +2.4g to minus 0.3g were measured at the aircraft's center of gravity. There were 141 passengers and 11 crewmembers aboard. As a result of the accident, one passenger was injured fatally; one flight attendant and two other passengers were injured seriously. The National Transportation Safety Board determined that the probable cause of this accident was a combination of design tolerances in the aircraft's longitudinal control system which, under certain conditions, produced a critical relationship between control forces and aircraft response. GRA

N75-12916# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.
AIRCRAFT ACCIDENT REPORT: NATIONAL AIRLINES, INCORPORATED, McDONNELL-DOUGLAS DC-10-10, N60NA, NEAR TAMPA, FLORIDA, 8 JULY 1974 Aircraft Accident Report
22 Jul. 1974 10 p
(PB-234791/2; NTSB-AAR-74-9) Avail: NTIS HC $3.25 CSCL 01B

About 0940 e.d.t. on July 8, 1974, cowling from the aft section of the No. 1 engine of National Airlines, Inc., Flight 41, separated from the aircraft during climbout from Miami International Airport, Miami, Florida. The cowling tore large holes in the left wing leading edge and in the upper wing surface before being ingested into the No. 2 engine. The flightcrew made an immediate emergency landing at Tampa International Airport, Tampa, Florida, without further difficulty. There were no injuries. The National Transportation Safety Board determined that the probable cause of the accident was the failure of company maintenance personnel to complete the installation of mounting bolts on the inboard panel of the No. 1 engine core cowl. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *Communications*.

N75-12917 Princeton Univ., N.J.
THE ANALYSIS AND DESIGN OF AIR TRAFFIC CONTROL ALGORITHMS IN THE NEAR TERMINAL AREA Ph.D. Thesis
Richard Vandervoort Cox 1974 165 p
Avail: Univ. Microfilms Order No. 74-25947

This thesis deals with the analysis and design of air traffic control algorithms. Emphasis is placed on the interaction between the practical and theoretical aspects of the problem. The statistical properties of the optimal control law, when applied to a shifted exponential process, are investigated. It is shown that a bunching phenomenon results which reduces the infinite string problem to an infinite number of finite string problems. This means that the control law can be easily applied. The bunching phenomenon and the steady state are investigated and the results are found to describe the statistical behavior of the system under the optimal control law. This investigation also shows the need for delay capability in any actual algorithm. The simulation of ATC algorithms is treated. Models for the radar errors and pilot errors are discussed. A wind response model is referenced for use in the simulations and the problem of tracking filters discussed. Dissert. Abstr.

N75-12918*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
MULTIPLE IMU SYSTEM TEST PLAN, VOLUME 4
Martin Landey, Kenneth T. Vincent, Jr., and Roy S. Whittredge Oct. 1974 118 p
(Contract NAS8-27624)
(NASA-CR-120541; R-798-Vol-4) Avail: NTIS HC $5.25 CSCL 17G

Operating procedures for this redundant system are described. A test plan is developed with two objectives. First, performance of the hardware and software delivered is demonstrated. Second, applicability of multiple IMU systems to the space shuttle mission is shown through detailed experiments with FDI algorithms and other multiple IMU software: gyrocompassing, calibration, and navigation. Gimbal flip is examined in light of its possible detrimental effects on FDI and navigation. For Vol. 3, see N74-10296. Author

N75-12919# Lincoln Lab., Mass. Inst. of Tech., Lexington.
A SIMULATION OF THE DABS SENSOR FOR EVALUATING REPLY PROCESSOR PERFORMANCE
R. J. McAulay and V. Vitto 16 Sep. 1974 49 p refs
(Contracts DOT-FA72WAI-261; F19628-73-C-0002; Proj. 034-241-012)
(AD-787633; ATC-28; FAA-RD-74-123) Avail: NTIS HC $3.75

In order to evaluate the effects of Air Traffic Control Radar Beacon System interference on the design of Discrete Address Beacon System (DABS) sensor, a simulation program was developed. A detailed model of the sensor is presented that takes into account many of the antenna pattern and signal processing design parameters. A model for the fruit generator was developed so that reply processor performance in typical 1980 high density fruit environments can be evaluated. A particular reply processing algorithm was adopted as a baseline to decode DABS messages and produce a data edited azimuth estimate, so that the design methodology can be illustrated. Statistics characterizing the reliablity of the processor were computed as a function of fruit rate and signalling conditions. Author

N75-12920# Federal Aviation Administration, Washington, D.C. Office of Systems Engineering Management.
MULTI-SITE INTERROGATION SCHEDULING FOR THE DISCRETE ADDRESS BEACON SYSTEM Final Report
Edmund J. Koenke and Joseph P. Tymczyszyn Sep. 1974 97 p refs
(AD-787231; FAA-EM-74-14) Avail: NTIS HC $5.25

A theoretical analysis and computer simulation were undertaken to develop a DABS/ATCRBS scheduling algorithm which would be capable of servicing the projected Los Angeles Basin. A satisfactory technique was found using sub-epoch timing, partitioning between packed and synchro calls, and time-sharing. The technique provides garble-free Synchro DABS service in the multi-site DABS/ATCRBS environment. Time is provided during the packed call interval for extended length messages and target reinterrogation. The ATCRBS PRF was reduced to 150 (7 hits/scan), but high uplink reliability was introduced by using time synchronization of ATCRBS sites with the firing time of each site calculated as a function of antenna azimuth. The ATCRBS transponder suppression due to asynchronous multiple site interrogations was eliminated. The scheduling algorithm was verified by analysis and computer simulation to service the LA Basin with both a 4 DABS/8 ATCRBS site model and an 8 DABS/8 ATCRBS site model. Author

N75-12921# Lincoln Lab., Mass. Inst. of Tech., Lexington.
DEVELOPMENT OF A DISCRETE ADDRESS BEACON SYSTEM Quarterly Technical Summary, 1 Apr. - 30 Jun. 1974
1 Jul. 1974 78 p refs
(Contracts DOT-FA72WAI-261; F19628-73-C-0002; FAA Proj. 034-241-012)
(AD-786272; FAA-RD-74-136) Avail: NTIS HC $4.00

The results are presented of analytical studies, laboratory and flight experiments and software developments supporting the concept feasibility and performance definition phase of the Federal Aviation Administration Discrete Address Beacon System Program. Author

N75-12922# Federal Aviation Administration, Atlantic City, N.J.
NATIONAL AIRSPACE SYSTEM EN ROUTE STAGE A SYSTEM ENGINEERING AND ANALYSIS, INVESTIGATION OF SYSTEM PROBLEMS, CAPACITY TESTING Final Report, Aug. 1972 - Oct. 1973
Harry T. Morgan, Jr. Apr. 1974 26 p refs
(FAA Proj. 121-101-100)
(AD-778479; FAA-NA-73-109; FAA-RD-74-51) Avail: NTIS HC $3.25

A series of special engineering tests was designed to determine whether any capacity limitations would occur when NAS 3dI was operated under steadily increasing traffic load. The tests were performed at the National Aviation Facility Experimental Center (NAFEC) employing the digital simulation facility and the system support facility. Both the display channel complex and the computer display channel modes of operation were investigated. NAS 3dI successfully met capacity test criteria. Author

N75-12923# National Aviation Facilities Experimental Center, Atlantic City, N.J.
THE 1973 LOS ANGELES AIR ROUTE TRAFFIC CONTROL CENTER'S AIR TRAFFIC MODEL Final Report
Francis M. Willett, Jr. Jun. 1974 109 p refs
(FAA Proj. 013-601-04(o))
(AD-781387; FAA-NA-74-11; FAA-RD-74-42) Avail: NTIS HC $4.50

The purpose of the traffic sample model was to develop a standard to test future air traffic systems and equipment. A model was constructed of a three-dimensional aircraft movement operating in the Los Angeles Air Route Traffic Control Center's (ARTCC) area. The model contained flight operational data which occurred on March 14, 1973, under the control of the Los Angeles ARTCC during a 3-hour period. An air traffic model was developed consisting of 619 operations generated by 512 aircraft flights. This model is representative of the operations of a high-density domestic center. Also included are data analyses of the operation of airports and aircraft in the model. Author

N75-12924# Lincoln Lab., Mass. Inst. of Tech., Lexington.
PROVISIONAL MESSAGE FORMATS AND PROTOCOLS FOR THE DABS IPC/PWI DISPLAY
P. H. Robeck and J. D. Welch 24 May 1974 25 p refs
(Contracts DOT-FA72WAI-261; F19628-73-C-0002; FAA Proj. 034-241-012)
(AD-780381; ATC-35; FAA-RD-74-83) Avail: NTIS HC $3.25

Provisional formats for the data link portion of the signals-in-space which are part of the DABS interrogations and replies are described. Also included is a discussion of the characteristics that these signals assume while transmitted from the transponder proper to the instrument which delivers the messages to the pilot. Specifically, formats, algorithms, and protocols are assigned to serve the IPC (Intermittent Positive Control) PWI (Proximity Warning Indicator), and ATC (numerical indicator) functions. The protocol and algorithm for the pilot acknowledgment link is also included. Author

N75-12925# McDonnell-Douglas Electronics Co., St. Charles, Mo.
SYNCHRONIZATION STATION LOCATION STUDY, CALIBRATION STUDY PHASE Final Report, May - Oct. 1973
J. M. Holt, F. D. Watson, and C. J. Neumann Oct. 1973 150 p refs
(Contract DOT-FA73WA-3172; FAA Proj. 052-241-026)
(AD-779538; FAA-RD-73-173) Avail: NTIS HC $4.75

A calibration study was performed to validate the critical and sensitive aspects of the methodology for determining siteing criteria and installation priority for deployment of ground stations that provide precision time service. Several nonhierarchal aircraft population models and several measures of system effectiveness were investigated. The conclusion is reached that a set of master station sites can be selected which obtain very high levels of all examined effectiveness measures when servicing any foreseeable population of nonhierarchal aircraft. It is further shown that the number of master stations required to furnish this level of effectiveness increases rapidly as the number of hierarchal aircraft is diminished. Sites are derived based on normal airline operations. Author

N75-12926# National Aviation Facilities Experimental Center, Atlantic City, N.J. ATC Systems Div.
SURVEY OF NATIONAL AIRSPACE SYSTEM EN ROUTE RELATED SUPPORT AND DATA REDUCTION AND ANALYSIS PROGRAMS Final Report, Jun. 1973 - Jan. 1974

Gary Ellison and Jim Egloff Mar. 1974 241 p
(AD-779495; FAA-RD-74-76) Avail: NTIS HC $6.00

This survey provides a list of IBM 9020 computer programs which were developed to aid in the development test, maintenance and enhancement of the NAS En Route Air Traffic Control Computer System. All data reduction programs, their input and output, lists of the supporting documentation and the areas of the program's usage are described. These areas of program usage include: surveillance system test, common digitizer testing, NAS system test, incident analysis, system performance analysis, and statistical counts and summaries of ARTCC operations.
Author

N75-12927# Meta Systems, Inc., Santa Clara, Calif.
REMOTE ENTRY OF PROGRESS REPORTS IN AN AUTOMATED OCEANIC AIR TRAFFIC CONTROL SYSTEM Final Report, Mar. 1972 - Dec. 1973
Frank V. Giallanza, Charles P. Giallanza, and James C. Brown Dec. 1973 43 p refs
(Contract DOT-FA72WA-2851)
(AD-779537; FAA-RD-73-71) Avail: NTIS HC $3.25

The requirements and procedures to input voice-derived progress from a remote source into an automated oceanic air traffic control system are described. The message formats and procedures to communicate with Aeronautical Radio, Inc. (ARINC) are described in detail. The description is supplemented with functional flowcharts which illustrate the process. Author

N75-12928# Autonetics, Anaheim, Calif.
CONCEPT FOR A SATELLITE-BASED ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM. VOLUME 3: OPERATIONAL LOGIC FLOW DIAGRAMS FOR A GENERIC ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM Final Report, Oct. 1972 - Oct. 1973
C. V. Hamilton, C. S. Hoffman, J. B. King, and R. J. Knight Feb. 1974 181 p
(Contract DOT-TSC-508)
(PB-234271/5; DOT-TSC-OST-73-29-8-Vol-3) Avail: NTIS HC $7.00 CSCL 17G

A description is presented of the services a generic advanced air traffic management system (AATMS) should provide to the users of the system to facilitate the safe, efficient flow of traffic. It provides a definition of the functions which the system must perform to provide these services and relates them to the various phases or segments of flight encountered in a general flight profile. A series of detailed operational logic flow diagrams, which specify individual tasks or activities which must be accomplished to complete each function, are also presented. These flow diagrams were generated as an aid in the development of a digital simulation of an AARMS. They are required as a basis for subsystem mechanization and for the analysis of system implementations. GRA

N75-12929# Mitre Corp., McLean, Va.
AN ADVANCED AIR TRAFFIC MANAGEMENT CONCEPT BASED ON EXTENSIONS OF THE UPGRADED THIRD GENERATION ATC SYSTEM. SYSTEM B: GENERAL REQUIREMENTS SPECIFICATION
R. M. Harris Feb. 1974 186 p refs
(Contract DOT-FA70WA-2448)
(AD-785264; MTR-6419-Ser-2; FAA-EM-73-10A-Ser-2) Avail: NTIS HC $5.50

A preliminary outline for a study of competing air traffic control systems for the 1990 era is presented. The ground rules for comparing two system approaches are given with emphasis on maintaining common assumptions with respect to air traffic demand, airport development, controller workload, automation levels, and the system elements already in place in 1982. A number of modifications were found to be necessary. Author

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N75-12930* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INTEGRATED LIFT/DRAG CONTROLLER FOR AIRCRAFT Patent
John W. Olcott (Aeronaut. Res. Assoc. of Princeton, Inc.), Edward Seckel (Aeronaut. Res. Assoc. of Princeton, Inc.), and David R. Ellis, inventors (to NASA) (Aeronaut. Res. Assoc. of Princeton, Inc.) Issued 26 Nov. 1974 11 p Filed 23 Mar. 1972 Supersedes N73-30938 (11 - 22, p 2613) Sponsored by NASA
(NASA-Case-ARC-10456-1; US-Patent-3,850,388; US-Patent-Appl-SN-237491; US-Patent-Class-244-75R; US-Patent-Class-74-480R; US-Patent-Class-244-83R; US-Patent-Class-416-25) Avail: US Patent Office CSCL 01C

A system for altering the lift/drag characteristics of powered aircraft to provide a safe means of glide path control includes a control device integrated for coordination action with the aircraft throttle. Such lift/drag alteration devices as spoilers, dive brakes, and the like are actuated by manual operation of a single lever coupled with the throttle for integrating, blending or coordinating power control. Improper operation of the controller is inhibited by safety mechanisms. Official Gazette of the U.S. Patent Office

N75-12931 California Inst. of Tech., Pasadena.
THEORETICAL INVESTIGATION OF MINIMUM TIME LOOP MANEUVERS OF JET AIRCRAFT Ph.D. Thesis
Sachio Uehara 1974 93 p
Avail: Univ. Microfilms Order No. 74-24455

Minimum time loop maneuvers of high performance jet aircraft have been investigated by means of the calculus of variations. A number of simplifying assumptions have been made in the atmospheric conditions, aerodynamic parameters, and the number of controls and their upper and lower bounds, in order to obtain general features and basic characteristics of the problem. The optimal control (lift coefficient and thrust) has been determined as a function of the state variables and Lagrange multipliers. Possible transitions among the five optimal subarcs have been established by applying the corner conditions of variational calculus. These relationships are applicable to any minimum time maneuver in the vertical plane. The effects of the magnitudes of maximum lift coefficient and maximum thrust on the control program, maneuver time, final speed, and final horizontal distance for minimum time loop maneuvers are explored through numerical computation. It is found that the control history in lift and thrust and the minimum time required for a loop maneuver depend strongly on the magnitudes of maximum lift coefficient and maximum thrust. Dissert. Abstr.

N75-12932*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
THE EFFECT OF CANARD LEADING EDGE SWEEP AND DIHEDRAL ANGLE ON THE LONGITUDINAL AND LATERAL AERODYNAMIC CHARACTERISTIC OF A CLOSE-COUPLED CANARD-WING CONFIGURATION
Blair B. Gloss Washington Dec. 1974 70 p refs
(NASA-TN-D-7814; L-9788) Avail: NTIS HC $4.25 CSCL 01C

A generalized wind-tunnel model, with canard and wing planforms typical of highly maneuverable aircraft, was tested in the Langley high-speed 7- by 10-foot tunnel at a Mach number of 0.30. The test was conducted in order to determine the effects of canard sweep and canard dihedral on canard-wing interference at high angles of attack. In general, the effect of canard sweep on lift is small up to an angle of attack of 16 deg. However, for angles of attack greater than 16 deg, an increase in the canard sweep results in an increase in lift developed by the canard when the canard is above or in the wing chord plane. This increased lift results in a lift increase for the total configuration for the canard above the wing chord plane. For the canard in the wing chord plane, the increased canard lift is partially lost by increased interference on the wing. Author

N75-12933*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SIMULATION STUDY OF INTRACITY HELICOPTER OPERATIONS UNDER INSTRUMENT CONDITIONS TO CATEGORY 1 MINIMUMS
William M. Callan, Jacob A. Houck, and Daniel J. DiCarlo Washington Dec. 1974 24 p refs
(NASA-TN-D-7786; L-9709) Avail: NTIS HC $3.25 CSCL 01B

A fixed-base simulator study was conducted to define pilot workload and task performance associated with instrument flight operations for an intracity helicopter passenger service. Displays considered necessary to provide a minimal capability under Instrument Flight Rules conditions were used to fly a representative commercial helicopter route structure in the New York area, with each terminal assumed to be equipped with a precision approach guidance system. A cross section of pilots participated as test subjects, and despite the high workload level, the results indicated that for the assumptions employed, minimums of 61 m (200 ft) ceiling and 805 m (0.5 mile) visibility were feasible. Author

N75-12934*# Northrop Corp., Hawthorne, Calif. Aircraft Div.
INVESTIGATION OF NORTHROP F-5A WING BUFFET INTENSITY IN TRANSONIC FLIGHT
Hwang Chintsun and W. S. Pi Washington NASA Nov. 1974 186 p refs
(Contract NAS2-6475)
(NASA-CR-2484) Avail: NTIS HC $7.00 CSCL 01C

A flight test and data processing program utilizing a Northrop F-5A aircraft instrumented to acquire buffet pressures and response data during transonic maneuvers is discussed. The data are presented in real-time format followed by spectral and statistical analyses. Also covered is a comparison of the aircraft response data with computed responses based on the measured buffet pressures. Author

N75-12935*# Massachusetts Inst. of Tech., Cambridge. Aeroelastic and Structures Research Lab.
A STUDY OF GUST RESPONSE FOR A ROTOR-PROPELLER IN CRUISING FLIGHT
Masahiro Yasue Aug. 1974 237 p refs
(Contract NAS2-7262)
(NASA-CR-137537; ASRL-TR-174-1) Avail: NTIS HC $7.50 CSCL 01C

Equations of motion for a rotor-propeller aircraft in cruising flight have been developed and implemented in a computer program. The formulation is based on Galerkin's method using coupled mode shapes for the blade and wing. This procedure is applied to the analysis of two types of rotors, gimballed rotor and hingeless. The results are evaluated by means of eigenvalue analysis of the stability of the system and frequency response analysis of the gust and control response. Author

N75-12936# National Aeronautical Establishment, Ottawa (Ontario).
FLIGHT LOADS ON LARGE AIRCRAFT ENGAGED IN 1974 BUDWORM SPRAYING PROGRAM
G. S. Campbell Sep. 1974 29 p refs
(LTR-ST-733) Avail: NTIS HC $3.75

A large area of forest in the province of Quebec was sprayed by aircraft in the annual program to protect against spruce budworm. Three of the four aircraft types used were large 4-engine piston airplanes, converted from their original role of passenger aircraft. Spraying was done at altitudes of 300 ft. to 400 ft. above ground level and so the aircraft were subjected to a more severe load spectrum than would be experienced in the normal airline operation for which they were designed, resulting in a decrease in their expected fatigue life. The loads on several of the aircraft were monitored with solid state acceleration level counters and a total of 79.6 hours of data representing aircraft design stress levels were obtained for subsequent analysis. Results of the study are provided. Author

N75-12937*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
CALCULATION OF THE TWIST DISTRIBUTION OF WINGS DESIGNED FOR CRUISE AT TRANSONIC SPEEDS
Michael J. Mann Washington Dec. 1974 25 p refs
(NASA-TN-D-7813; L-9832) Avail: NTIS HC $3.25 CSCL 01C

The use of linear theory in calculating the twist distribution of a wing designed for cruise at supercritical speeds is justified on the basis of the transonic equivalence rule. A modified version of Multhopp's subsonic lifting-surface theory was used to calculate the twist distribution. The lifting-surface theory is compared with both slender wing theory and experimental results. A study was also made of the effect of wing sweep on the twist distribution required to maintain an elliptic span load at cruise conditions. The important parameters used in establishing this twist distribution are identified. Author

N75-12938*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SUBSONIC ROLL-DAMPING CHARACTERISTICS OF A SERIES OF WINGS
Richmond P. Boyden Washington Dec. 1974 39 p refs
(NASA-TN-D-7827; L-8854) Avail: NTIS HC $3.75 CSCL 01B

The aerodynamic damping in roll of a series of wings has been investigated in the Langley high-speed 7- by 10-foot tunnel at Mach numbers ranging from 0.2 to 0.8 by use of a forced oscillatory-roll technique. Tests were conducted on wings of aspect ratio 6 with sweep angles of 25, 35, and 45 deg and on 35 deg swept wings of aspect ratios 4 and 5. Author

N75-12939*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EXPERIMENTAL INVESTIGATION OF THE CORNERING CHARACTERISTICS OF 18 BY 5.5, TYPE 7, AIRCRAFT TIRES WITH DIFFERENT TREAD PATTERNS
Robert C. Dreher and John A. Tanner Washington Dec. 1974 21 p refs
(NASA-TN-D-7815; L-9795) Avail: NTIS HC $3.25 CSCL 01C

The characteristics, which include the cornering-force and drag-force friction coefficients and self-alining torque, were obtained on dry, damp, and flooded runway surfaces over a range of yaw angles from 0 deg to 12 deg and at ground speeds from approximately 5 to 90 knots. The results indicate that a tread pattern with pinholes in the ribs reduces the tire cornering capability at high yaw angles on a damp surface but improves cornering on a dry surface. A tread pattern which has transverse grooves across the entire width of the tread improves the tire cornering performance slightly at high speeds on the flooded runway surface. The cornering capability of all the tires is degraded at high ground speeds by thin film lubrication and/or tire hydroplaning effects. Alterations to the conventional tread pattern provide only marginal improvements in the tire cornering capability which suggests that runway surface treatments may be a more effective way of improving aircraft ground performance during wet operations. Author

N75-12940*# Boeing Commercial Airplane Co., Seattle, Wash.
UPPER-SURFACE BLOWING NACELLE DESIGN STUDY FOR A SWEPT WING AIRPLANE AT CRUISE CONDITIONS
Final Report
W. B. Gillette, L. W. Mohn, H. G. Ridley, and T. C. Nark Washington NASA Sep. 1974 126 p refs
(Contract NAS1-12214)
(NASA-CR-2427; D6-41763) Avail: NTIS HC $5.75 CSCL 01C

A study was made to design two types of overwing nacelles for an existing wing-body at a design condition of Mach = 0.8 and C sub L = 0.2. Internal and external surface contours were developed for nacelles having either a D-shaped nozzle or a high-aspect-ratio nozzle for upper-surface blowing in the powered-lift mode of operation. The goal of the design was the development of external nacelle lines that would minimize high-speed aerodynamic interference effects. Each nacelle type was designed for both two- and four-engine airplanes using an iterative process of aerodynamic potential flow analysis. Incremental nacelle drag estimates were made for flow-through wind tunnel models of each configuration. Author

N75-12941*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
WIND TUNNEL INVESTIGATION OF A SIMULATED GUNSHIP HELICOPTER ENGINE-EXHAUST-WINDSTREAM INTERACTION
John C. Wilson and Raymond E. Mineck Washington Dec. 1974 71 p refs Prepared in cooperation with Army Air Mobility R and D Lab., Hampton, Va.
(NASA-TM-X-3161; L-9923) Avail: NTIS HC $4.25 CSCL 01C

A wind tunnel investigation of the engine exhaust and windstream flow interaction on a gunship helicopter model was conducted in the Langley V/STOL tunnel. The investigation utilized a flow visualization technique employing neutrally buoyant helium filled bubbles to determine the cause of exhaust shield overheating during cruising flight and to evaluate means of eliminating the problem. The flow patterns were recorded with still cameras and on television magnetic tape. Exhaust flow impingement on the exhaust shield during cruise was found to cause the problem. Several flow altering devices were evaluated to find suitable ways to correct the problem. A flow deflector located on the model cowling upstream of the exhaust provides an effective solution. Author

N75-12942# AiResearch Mfg. Co., Torrance, Calif.
FEASIBILITY STUDY AND DEMONSTRATION OF NITROGEN GENERATION FOR FUEL TANK INERTING Final Report, Jul. 1972 - Jun. 1974
Scott A. Manatt Jun. 1974 216 p refs
(Contract DOT-FA72WA-3140)
(AD-784950; FAA-RD-74-112) Avail: NTIS HC $5.75

Nitrogen fuel tank inerting has been shown to be an effective means of providing aircraft explosion prevention by reducing the O2 concentration below the lower limit for fuel vapor ignition. A reduction of O2 concentration to a level of 9% or less is sufficient to produce an incombustible environment for jet fuels and potential ignition sources. Generation of an inert gas from air has been investigated to reduce the weight and logistics penalities associated with inert gas storage. System requirements have been defined using the McDonnell Douglas DC-10 as a transport aircraft representative of potential applications. The study concluded that both the catalytic combustion of air with turbine engine fuels and air seperation by hollow fiber permeable membranes are viable candidates. Author

N75-12943*# Wichita State Univ., Kans.
DEVELOPMENT OF A FOWLER FLAP SYSTEM FOR A HIGH PERFORMANCE GENERAL AVIATION AIRFOIL
W. H. Wentz, Jr. and H. C. Seetharam Washington NASA Dec. 1974 115 p refs Prepared for Kanas Univ. Center for Res., Inc.
(Grant NGR-17-002-072)
(NASA-CR-2443) Avail: NTIS HC $5.25 CSCL 01C

A two-dimensional wind-tunnel evaluation of two Fowler flap configurations on the new GA(W)-1 airfoil was conducted. One configuration used a computer-designed 29-percent chord Fowler flap. The second configuration was modified to have increased Fowler action with a 30-percent chord flap. Force, pressure, and flow-visualization data were obtained at Reynolds numbers of 2.2 million to 2.9 million. Optimum slot geometry and performance were found to be close to computer predictions. A C sub L max of 3.8 was achieved. Optimum flap deflection, slot gap, and flap overlap are presented as functions of C sub L. Tests were made with the lower surface cusp filled in to show the performance penalties that result. Some data on the effects of adding vortex generators and hinged-plate spoilers were obtained. Author

N75-12944# General Dynamics/Convair, San Diego, Calif. Aerospace Div.
WEAPON SYSTEM COSTING METHODOLOGY FOR AIRCRAFT AIRFRAMES AND BASIC STRUCTURES. VOLUME 4: ESTIMATING TECHNIQUES HANDBOOK Interim Technical Report, Jul. 1972 - Sep. 1973
R. E. Kenyon Apr. 1974 77 p refs
(Contract F33615-72-C-2083; AF Proj. 1368)
(AD-785375; AFFDL-TR-73-129-Vol-4) Avail: NTIS CSCL 01/3

This report presents the interim results of a study aimed at extending cost estimating techniques developed and demonstrated under a previous contract. The previous study provided a trade study and a system study costing method for empennage elements. During the initial phase of the current study, these capabilities have been extended to include all aerodynamic surfaces: horizontal stabilizer, vertical stabilizer, canards treated as a stabilizer, and wings, including secondary structure. This volume provides a handbook as a guide to the trade study cost estimating technique. The function of the computer program is described. The program output format and the input data requirement and its organization are discussed and reference is provided to the cost estimating logic involved. Author (GRA)

N75-12945# Army Air Mobility Research and Development Lab., Hampton, Va.
HELICOPTER GROUND RESONANCE ANALYSIS IN LIGHT OF ARMY REQUIREMENTS
Charles E. Hammond 1974 16 p refs
(AD-785628) Avail: NTIS CSCL 01/3

The Army has in recent years refined its methods of procuring aircraft. Until recently the Army had only procured aircraft which were more or less off-the-shelf items. That is, the aircraft were either developed for other military services or for civilian use and were adapted to meet Army needs. As a result, the Army was not significantly involved in the writing of specifications which affected the overall design of the vehicle. Operational experience has indicated, however, the need for specifications which reflect the particular requirements of Army aviation. This paper is concerned with requirements which have been imposed in the area of helicopter mechanical instability, or ground resonance as this phenomenon is commonly known, and the impact which these requirements have on the analyst. GRA

N75-12946# Kaman Aerospace Corp., Bloomfield, Conn.
DEVELOPMENT OF A METHOD FOR THE ANALYSIS OF IMPROVED HELICOPTER DESIGN CRITERIA Final Report
Ross F. Metzger, Arved Plaks, Richard C. Meier, and Alex Berman Jul. 1974 215 p refs
(Contract DAAJ02-72-C-0064; DA Proj. 1F1-62208-AA-82)
(AD-783392; R-1172; USAAMRDL-TR-74-30) Avail: NTIS CSCL 01/3

A method has been developed to allow the evaluation of helicopter design criteria. Analytical models have been developed which include mission analysis, performance relationships, statistical and analytical weight predictions, mission effectiveness (including payload utilization data and environmental statistics), and fixed and operational cost estimations. The models are specifically designed to determine the cost effectiveness of a two-point design criterion. A computer program known as ZODIAC 2 was developed to implement these and other analytical models. A user's guide for the program and illustrative computations are presented. Author (GRA)

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N75-12947*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
MAGNETIC HEADING REFERENCE Patent Application
Howell D. Garner, inventor (to NASA) Filed 11 Dec. 1974 23 p
(NASA-Case-LAR-11387-1; US-Patent-Appl-SN-531647) Avail: NTIS HC $3.25 CSCL 14B

The development and characteristics of a magnetometer which is used as a magnetic heading reference for small aircraft are discussed. In addition to providing a heading reference the device also corrects the output of the magnetometer to reduce the amount of northerly turning error. The inputs of the fluidic rate sensor and the rate bridge to the demodulator coils of the instrument are diagrammed. The application of the device to automatic pilots is analyzed. NASA

N75-12948*# Kanner (Leo) Associates, Redwood City, Calif.
AN INSTRUMENT PANEL ON A COLOR IMAGE TUBE
G. Raynaud Washington NASA Dec. 1974 9 p Transl. into ENGLISH from Rev. Med. Aeron. Spatiale (France), v. 11, 4th Quarter, 1972 p 217-219
(Contract NASw-2481)
(NASA-TT-F-16051) Avail: NTIS HC $3.25 CSCL 01D

Instrument panel component consisting of a cathode screen able to display the main flight parameters is described. The wavelengths of the three colors used and their brightness and contrast under varying intensities of ambient illumination are given. It is shown that the compactness of the screen and the fact that the data are given in predigested form greatly simplify the task of collecting information. Author

N75-12949# Federal Aviation Administration, Washington, D.C.
EXPERIMENTATION AND EVALUATION OF IMPROVED STALL WARNING EQUIPMENT, PHASE 2 Final Report
Barry Scott May 1974 64 p refs Revised
(FAA Proj. 560-101-02(X))
(AD-780379; FAA-RD-73-179-Rev) Avail: NTIS HC $3.75

A flight test project was conducted to test and evaluate contemporary and improved general aviation aircraft stall warning systems. The purpose of the project was to determine the adequacy of present criteria. Five stall warning systems were tested during the program. The test vehicle was a 1964 Cessna 210D completely instrumented for flight test work with the airborne digital data acquisition system. Author

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N75-12950*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INTERIM PREDICTION METHOD FOR LOW FREQUENCY CORE ENGINE NOISE
Ronald G. Huff, Bruce Clark, and Robert G. Dorsch Nov. 1974 25 p
(NASA-TM-X-71627; E-8154) Avail: NTIS HC $3.25 CSCL 21E

A literature survey on low-frequency core engine noise is presented. Possible sources of low frequency internally generated noise in core engines are discussed with emphasis on combustion and component scrubbing noise. An interim method is recommended for predicting low frequency core engine noise that is dominant when jet velocities are low. Suggestions are made for future research on low frequency core engine noise that will aid in improving the prediction method and help define possible additional internal noise sources. Author

N75-12951*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INFLUENCE OF MIXER NOZZLE VELOCITY DECAY CHARACTERISTICS ON CTOL-OTW JET NOISE SHIELDING
U. VonGlahn and D. Groesbeck 1974 19 p refs Presented at the 13th Aerospace Sci. Meeting, Pasadena, Calif., 20-22 Jan. 1975; sponsored by AIAA
(NASA-TM-X-71631; E-8168) Avail: NTIS HC $3.25 CSCL 20A

Jet noise shielding benefits for CTOL engine-over-the-wing configurations were obtained with model scale multitube and lobed mixer nozzles and various shielding surface geometries. Spectral data were obtained with jet velocities from 585 to 1110 ft/sec. Correlation equations for predicting jet noise shielding benefits with single conical nozzle installations were modified to correlate the mixer nozzle data. The modification included consideration of the number of nozzle elements and the peak axial velocity decay in the flow field adjacent to the shielding surface. The effect of forward velocity on jet noise attenuation by a shielding surface is discussed. Author

N75-12952*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN EXPERIMENTAL STUDY OF THE EFFECT OF TREATED LENGTH ON FAN INLET NOISE SUPPRESSORS
James H. Dittmar and John F. Groeneweg 1974 17 p refs Presented at 13th Aerospace Sci. Meeting, Pasadena, Calif., 20-22 Jan. 1975; sponsored by AIAA
(NASA-TM-X-71628; E-7999) Avail: NTIS HC $3.25 CSCL 20A

The effect of length of acoustic treatment was studied on a full scale fan using two different inlets. Analysis of the data revealed that measured suppression varied linearly with the length of the ringed liner segments as anticipated. Further analysis indicated that the wall only portion of the treatment was substantially more effective than anticipated, suggesting that, if only moderate suppression is needed, wall only treatment may suffice. The two inlets behaved similarly. Introduction of a hard exhaust splitter into the configuration resulted in a noise increase at certain frequencies. Author

N75-12953*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MODIFICATIONS THAT IMPROVE PERFORMANCE OF A DOUBLE ANNULAR COMBUSTOR AT SIMULATED ENGINE IDLE CONDITIONS
Donald F. Schultz Washington Dec. 1974 31 p refs
(NASA-TM-X-3127; E-7960) Avail: NTIS HC $3.75 CSCL 21E

Techniques were evaluated to determine if simple combustor modifications could be used to reduce the engine ground idle emissions of a double annular combustor designed for Mach 3.0 cruise operation. These techniques were radial fuel staging, the use of radial-inflow rather than axial-flow air swirlers, and the optimization of fuel-nozzle spray angle and differential pressure. Radial fuel staging and the use of radial-inflow air swirlers significantly improved performance at two ground idle test conditions simulating both low- and high-compression ratio engines. Author

N75-12954# Advisory Group for Aerospace Research and Development, Paris (France).
DISTORTION INDUCED ENGINE INSTABILITY
Oct. 1974 182 p refs Lecture series held at London, 7-8 Nov. 1974, at Wright-Patterson AFB, Ohio, 11-12 Nov. 1974, and Philadelphia, 14-15 Nov. 1974
(AGARD-LS-72) Avail: NTIS HC $7.00

The design criteria for jet aircraft engines and turbomachinery to obtain minimum airflow distortion and engine instability is discussed. The sources of distortion are identified. The aerodynamic and mechanical response of selected engines under distorted flow conditions are analyzed. Techniques for predicting and measuring the stability of an engine are described. Methods for increasing the tolerance of the engine to distorted flow in order to obtain more stable operation are explained. For individual titles, see N75-12955 through N75-12961.

N75-12955 Naval Postgraduate School, Monterey, Calif.
INTRODUCTION TO DISTORTION INDUCED ENGINE INSTABILITY
Allen E. Fuhs *In* AGARD Distortion Induced Eng. Instability Oct. 1974 19 p refs (For availability see N75-12954 04-07)

Propulsion system instability, which may be caused by distorted inlet flow, is a recurring problem which must be solved in each new aircraft development program. Trends in engine and airframe design that keep distortion sensitivity as a continuing problem are discussed. Sources of inlet flow distortion are catalogued. This information is used to assess the potential difficulties in development of a variety of aircraft types. Methods for describing distortion both experimentally and conceptually are introduced. Sufficient background is stated to provide a perspective of the lecture series. Author

N75-12956 Societe Nationale d'Etude et de Construction de Moteurs d'Aviation, Villaroche (France).
SOURCES OF DISTORTION AND COMPATIBILITY

R. Bouillet and J. M. Brasseur *In* AGARD Distortion Induced Eng. Instability Oct. 1974 11 p refs (For availability see N75-12954 04-07)

An analysis of the sources of flow distortion and operating compatibility for jet aircraft engines was conducted. The aspects of flow distortion considered are: (1) various operating cases of air intakes, (2) air intake design and engine compatibility, (3) test facilities required to compensate the lack of theoretical data and to confirm predictions, and (4) typical examples of air intake modifications aiming at significant improvement of the internal flow. The conditions of operation considered are normal operation in which the velocity field around the aircraft in an assumed infinite atmosphere is the only factor considered, and operation under conditions of disturbances from ground effect. Author

N75-12957 Rolls-Royce, Ltd., Bristol (England). Installation Aerodynamics Dept.

AERODYNAMIC RESPONSE

R. G. Hercock and D. D. Williams *In* AGARD Distortion Induced Eng. Instability Oct. 1974 41 p refs (For availability see N75-12954 04-07)

The aerodynamic response of turbomachinery to steady and time-variant total pressure and temperature distortion is discussed. Examples of changes in compressor characteristics are presented. Experimental correlations of surge margin loss, the concept of a critical or effective spoiled sector angle and compressor sensitivity are then discussed in relation to simple theoretical ideas for circumferential distortion. The development of the distortion index approach to account for the effect of radial and mixed radial - circumferential total pressure distortion and the impact of turbulence or unsteady flow is outlined. Comments on foreign gas ingestion are made. Some current auditing procedures are described. Limitations of isolated spool rig tests are discussed, and surge hammershock data are presented. Author

N75-12958 Stevens Inst. of Tech., Hoboken, N.J. Dept. of Mechanical Engineering.

AEROMECHANICAL RESPONSE

F. Sisto *In* AGARD Distortion Induced Eng. Instability Oct. 1974 13 p refs (For availability see N75-12954 04-07)

Physical mechanisms are discussed which lead to the aeromechanical response of axial-flow fan and compressor components when these machines operate with a distorted inlet flow. Steady response of blades, vanes and discs are considered briefly. Forced excitation of rotating components are treated. The specific form of the exciting gusts are elucidated. Self-excited vibrations of rotor blades and stator vanes are considered as stemming from the general degradation of flow with distortion. Shaft and disc vibrations are also discussed as possible aeromechanical responses to distorted flow. The role of various forms of damping and the use of composite materials are described with attendant problems in application through design. Remedial action available to the aeromechanical engineer is discussed with the objective of ameliorating the adverse effects of distorted-induced structural response. Author

N75-12959 Motoren- und Turbinen-Union Muenchen G.m.b.H. (West Germany).

PREDICTION TECHNIQUES

H. Mokelke *In* AGARD Distortion Induced Eng. Instability Oct. 1974 32 p refs (For availability see N75-12954 04-07)

An outline is presented on mathematical modelling for prediction of the aerodynamic response of aircraft engine compressors to steady-state and time-dependent pressure and temperature distortion. A detailed review is made of various models. In particular their assumptions, their limitations for practical applications and their scope for further development are discussed. Results predicted with the models (as far as possible compared with experimental evidence) are selected from published works. Author

N75-12960* National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.

TEST TECHNIQUES, INSTRUMENTATION, AND DATA PROCESSING

William G. Schweikhard *In* AGARD Distortion Induced Eng. Instability Oct. 1974 43 p refs (For availability see N75-12954 04-07)

CSCL 21E

Procedures for determining the effects of dynamic distortion on engine stability are analyzed. The test techniques, methods and types of instrumentation, and data processing functions are described. The advantages and limitations of various methods are reported. It is emphasized that ground facility tests are only a simulation of the flight environment, that instrumentation provides only a partial representation of the physical phenomena, and that poorly organized data processing procedures can impede and even distort the final result. Author

N75-12961 Pratt and Whitney Aircraft, East Hartford, Conn.

METHODS TO INCREASE ENGINE STABILITY AND TOLERANCE TO DISTORTION

A. A. Mikolajczak and A. M. Pfeffer *In* AGARD Distortion Induced Eng. Instability Oct. 1974 17 p refs (For availability see N75-12954 04-07)

Techniques used during engine design which ensure stable engine operation over the complete flight envelope of the aircraft in which it is installed are discussed. Adequate stability margin is required to allow for the expected levels of inlet distortion, engine to engine variations, engine aging and excursions of compressor operating lines during transients. Since the stability margin can be increased by raising the surge line of a compressor, increasing its tolerance to inlet distortion and modifying the design to reduce the sensitivity to transients, all these topics are treated in some depth. Emphasis is placed on the design for adequate stability margin and minimum penalty in engine fuel consumption, cost and weight. Author

N75-12962# Aeronautical Research Labs., Melbourne (Australia).

CONSTANT VOLUME GAS TURBINE: FURTHER EXPERIMENTS ON A SLEEVE-VALVED COMBUSTOR WITH GASEOUS FUEL

M. Zockel and A. Runacres Jun. 1974 28 p refs (ARL/ME-NOTE-350) Avail: NTIS HC $3.75

The feasibility of a gas turbine using constant volume combustion is investigated. Experiments using an improved sleeve-valved combustor burning gaseous propane fuel are described. The combustor had a greater length/diameter ratio than the earlier version and was found to give a better combustion pressure rise. The pressure rise was at fuel-air ratios required for gas turbine operation less than 50% of fuel-air ratios required to demonstrate a feasible engine combustion system. The combustor has the problems of excessive valve leakage and seizure of the rotating sleeve under hot operation conditions. The results indicate the need for designs in which the valve is separate from the combustor and the combustor arranged to achieve improved mixture stratification. Author

N75-12963# National Aerospace Lab., Tokyo (Japan).

ON THE REDUCTION OF UNSTEADY THERMAL STRESS IN AIR COOLED TURBINE BLADES

Toyoaki Yoshida and Masakatsu Matsuki 1974 30 p refs In JAPANESE; ENGLISH summary (NAL-TR-364) Avail: NTIS HC $3.75

Unsteady temperature distribution and thermal stress distribution of air cooled turbine blades, having thin wall thickness, were calculated under several assumptions. Transient temperature response after a sudden temperature change of the working fluid was approximated by the fundamental equation of one-dimensional heat conduction in the thickness direction, then transient thermal stress of the blade was calculated under the condition that plane remains plane, considering as in a quasi-steady state. As a result, excessive thermal stress was shown especially at the trailing edge region in a few seconds after a sudden temperature change of the working fluid. The position in which this excessive thermal stress occurred could be connected with the difference of the temperature response at each position of the blade. Author

N75-12964# Booz-Allen Applied Research, Inc., Bethesda, Md.

AIRCRAFT TAXIING NOISE MEASUREMENTS Final Report

Robert L. Hershey and Louie Turner, III Aug. 1974 137 p refs (Contract DOT-FA72WA-2823) (AD-787235; FAA-RD-74-114) Avail: NTIS HC $5.75

Taxiing noise measurements performed at Atlanta airport included passby noise measurements of taxiing planes and ambient noise samples from the terminal roof and inside the terminal building. The primary purpose of these measurements was to determine whether changes in noise level result from shutting off some engines during taxiing for fuel conservation and air pollution reduction. Analysis of noise data showed that although the noise levels of individual planes on the taxiways were reduced by engine shutoff, the noise environment of the air terminal building was unaffected. Measurements of taxiway passbys and stationary engine runups indicated that engine shutoff procedures reduce passby levels by 5 dbA for the DC-8 and 2 dbA for the 727. The reduction is 10 dbA for the DC-9 when measured on the side with the engine shutoff. Author

N75-12965# Federal Aviation Administration, Washington, D.C. Systems Research and Development Service.
STOL NOISE PREDICTION AND ATTENUATION MODELS IN SUPPORT OF REGULATORY EFFORT Final Report
Joseph K. Power Apr. 1974 86 p refs Presented at Joint Intern. Short Course: STOL Aircraft Technol. and the Community, 22-26 Apr. 1974; sponsored by Univ. of Tennessee Space Inst. and Tech. Univ., Aachen, Germany
(AD-777569; FAA-RD-74-70) Avail: NTIS HC $4.00

For commercial STOL aircraft, the most critical design parameter is the noise level. The impact of existing and expected noise regulations on the development of STOL aircraft is discussed. Models for STOL noise prediction are presented, as well as noise reduction mechanisms and a ranking of V/STOL aircraft noise sources. Author

N75-12966# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EXPERIMENTAL STUDY OF RESONANCE VIBRATIONS OF VARIED-FREQUENCY ROTOR BLADES OF AN AXIAL-FLOW COMPRESSOR
I. E. Zablotskii and R. A. Shipov 17 Apr. 1974 29 p refs Transl. into ENGLISH from Lopatochnye Mashiny i Struynye App. Sb. Statei (USSR), no. 6, 1972 p 131-150
(AD-778520/7; FTD-HT-23-675-74) Avail: NTIS HC $3.75 CSCL 21/5

A method for studying the resonance vibrations of axial flow compressor rotor blades under conditions of a slowly rotating peripheral nonuniformity of flow is presented. The equipment required and the procedures for conducting the tests are explained. The test instrument measures the amplitude of the blade-end displacements directly in a circumferential direction. A mathematical relationship is developed to determine the vibration characteristics based on the measured parameters. Author

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N75-12967*# Rensselaer Polytechnic Inst., Troy, N.Y. Systems Engineering Div.
DIGITAL ADAPTIVE FLIGHT CONTROLLER DEVELOPMENT
Howard Kaufman, Gurbux Alag, Paul Berry, and Samir Kotob Washington NASA Dec. 1974 123 p refs
(Grant NGR-33-018-183)
(NASA-CR-2466) Avail: NTIS HC $5.25 CSCL 01C

A design study of adaptive control logic suitable for implementation in modern airborne digital flight computers was conducted. Two designs are described for an example aircraft. Each of these designs uses a weighted least squares procedure to identify parameters defining the dynamics of the aircraft. The two designs differ in the way in which control law parameters are determined. One uses the solution of an optimal linear regulator problem to determine these parameters while the other uses a procedure called single stage optimization. Extensive simulation results and analysis leading to the designs are presented. Author

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N75-12968* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AUTOMATICALLY OPERABLE SELF-LEVELING LOAD TABLE Patent
John L. Burch, inventor (to NASA) Issued 10 Dec. 1974 9 p Filed 8 Aug. 1973 Supersedes N73-30428 (11 - 21, p 2548)
(NASA-Case-MFS-22039-1; US-Patent-3,853,075; US-Patent-Appl-SN-386790; US-Patent-Class-108-136) Avail: US Patent Office CSCL 14B

A self-leveling load table is described which is automatically maintained level by selectively opening and closing solenoid valves for inserting and removing air from chambers under the table. The table is floated in a fluid by nine air chambers beneath the top of the table. These chambers are open at the bottom and four oppositely located chambers are used for leveling the table by having the air increased or decreased by means of a flexible hose. Air bearing pendulums are used for selectively energizing solenoid valves which either apply pressurized air to the chamber or evacuate air from the chamber by means of a vacuum source. Official Gazette of the U.S. Patent Office

N75-12969* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
WIND TUNNEL FLOW GENERATION SECTION Patent
Norman E. Sorensen, inventor (to NASA) Issued 10 Dec. 1974 6 p Filed 13 Jul. 1973 Supersedes N73-27175 (11 - 18, p 125)
(NASA-Case-ARC-10710-1; US-Patent-3,853,003; US-Patent-Appl-SN-379019; US-Patent-Class-73-147) Avail: US Patent Office CSCL 14B

A flow generation section for a wind tunnel test facility is described which provides a uniform flow for the wind tunnel test section over a range of different flow velocities. The throat of the flow generation section includes a pair of opposed boundary walls which are porous to the flowing medium in order to provide an increase of velocity by expansion. A plenum chamber is associated with the exterior side of each of such porous walls to separate the same from ambient pressure. A suction manifold is connected by suction lines with each one of the chambers. Valves are positioned in each of the lines to enable the suction manifold to be independently varied.
Official Gazette of the U.S. Patent Office

N75-12970*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
GUST GENERATOR FOR A SUPERSONIC WIND TUNNEL
Bobby W. Saunders, Allan R. Bishop, and John A. Webb, Jr. Dec. 1974 37 p refs
(NASA-TM-X-3120; E-7978) Avail: NTIS CSCL 14B

The effectiveness was investigated of a flat plate gust generator that was located in the nozzle throat of the Lewis 10- by 10-foot supersonic wind tunnel. Gust plates were tested at nozzle wall Mach numbers of 3.1, 2.4, and 2.0. Test results show that the flat plate concept may be used as a gust generator for a wind tunnel; however, more extensive investigation is required to completely define its capabilities and limitations. For the single transient data point recorded, a gust amplitude (decrement) of 0.15 in Mach number was obtained. Analysis of these transient data indicates a response with a corner frequency of at least 8 hertz. Author

N75-12971*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DECOMPOSITION OF NITRIC OXIDE IN A HOT NITROGEN STREAM TO SYNTHESIZE AIR FOR HYPERSONIC WIND TUNNEL COMBUSTION TESTING
John F. Zumdieck and Steven A. Zlatarich Washington Dec. 1974 29 p refs

(NASA-TN-D-7849; E-8031) Avail: NTIS HC $3.75 CSCL 14B

A clean source of high enthalpy air was obtained from the exothermic decomposition of nitric oxide in the presence of strongly heated nitrogen. A nitric oxide jet was introduced into a confined coaxial nitrogen stream. Measurements were made of the extent of mixing and reaction. Experimental results are compared with one- and two-dimensional chemical kinetics computations. Both analyses predict much lower reactivity than was observed experimentally. Inlet nitrogen temperatures above 2400 K were sufficient to produce experimentally a completely reacted gas stream of synthetic air. Author

N75-12972# Ohio Univ., Athens. Avionics Engineering Center.

EXPERIMENTAL VALIDATION OF BOEING 747 ILS SIGNAL SCATTERING CALCULATIONS FOR CRITICAL AREA DETERMINATION Final Report, Sep. 1973 - Apr. 1974

Robert A. Rondini and Richard H. McFarland Jan. 1974 73 p refs

(Contract DOT-FA74WA-3361)

(AD-787609; FAA-RD-74-57; EER-18-1) Avail: NTIS HC $4.25

Charts showing recommended designated critical areas for aircraft parking on an airdrome are presented. These have been derived from data taken from extensive mathematical modeling of the effects of the Boeing 747 on the ILS signal in space and the recently completed experimental validation of these mathematical models. Presented also are contour charts which can be used to analyze the effects on the ILS of parking a Boeing 747 at specific locations on the airdrome. Author

N75-12973# Connecticut International Corp., Windsor Locks. SEPCO Div.

DEVELOPMENT OF EDGE LIGHTS FOR AIRPORT RUNWAYS AND TAXIWAYS Final Report, Oct. 1971 - Jun. 1973

Stanley N. Poulsen Feb. 1974 77 p

(Contract DOT-FA72WA-2726)

(AD-785857; FAA-RD-74-67) Avail: NTIS HC $4.75

A design and development program was conducted to produce lower cost elevated edge lights with improved performance for use as visual aids on airport runways and taxiways. High intensity semi-flush runway edge light assemblies with light output in the main beams equal to the high intensity elevated edge light output were also produced. The light assemblies will withstand temperature extremes from minus 55 C to plus 55 C, jet blasts up to and including 350 mph, high humidity as well as other severe environmental conditions. Author

N75-12974# Sola Basic Industries, Goldsboro, N.C. Hevi-Duty Electric Div.

APPROACH LIGHT SYSTEM (ALS). MULTIPLE DISTRIBUTION SYSTEM REDESIGN Final Report

Richard P. Marek Mar. 1974 85 p refs

(Contract DOT-FA71WA-2633)

(AD-786682; ESR-95; FAA-RD-74-47) Avail: NTIS HC $4.75

Recommendations for an Approach Light System (ALS) distribution system to provide a lower cost system without sacrificing reliability are presented. The distribution system is changed from a series output circuit system to a multiple type with constant voltage using parallel step-down transformers in place of the series to series transformers presently in use. The design concepts for Urban Residential Distribution (URD) are used to provide smaller and more compact major components. Author

N75-12975# National Aviation Facilities Experimental Center, Atlantic City, N.J.

EVALUATION OF AN EXPERIMENTAL ELEVATED HIGH-INTENSITY RUNWAY EDGE LIGHT Interim Report, Jun. 1973 - Mar. 1974

E. Leon Reamer Sep. 1974 67 p

(FAA Proj. 072-324-000)

(AD-785016; FAA-NA-74-23; FAA-RD-74-128) Avail: NTIS HC $4.00

The suitability of a newly designed elevated runway edge light to function in category I and category II operations when a high-intensity runway-light environment is prevalent was investigated. The work involved laboratory photometric measurements and analysis of pilot response after test flying the newly designed runway lighting system. The results of the tests indicated that the new design concept is appropriate for use under the conditions tested. Author

N75-12976*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EFFECTS OF VARIOUS RUNWAY LIGHTING PARAMETERS UPON THE RELATION BETWEEN RUNWAY VISUAL RANGE AND VISUAL RANGE OF CENTERLINE AND EDGE LIGHTS IN FOG Final Report

Richard F. Haines Dec. 1973 74 p refs

(Contract DOT-FA73WAI-346)

(NASA-TM-X-72170; AD-785320; FAA-RD-73-170) Avail: NTIS HC $4.00

Students and commercial airline pilots were tested to determine the effect of runway edge and centerline light intensity and spacing, fog density, ambient luminance level, and lateral and vertical offset distance of the subject from the runway's centerline upon horizontal visual range. Data were obtained to evaluate the adequacy of the Balanced Lighting System (BLS) to provide maximum visual range in fog viewing both centerline and runway edge lights. The daytime and nighttime BLS were compared against other candidate lighting systems. Results indicated statistically significant differences between the various fog densities and cockpit lateral offset conditions. Large differences were found between the day and nighttime mean visual range. Eye height above the runway played an important role in determining visual range. Author

N75-12977*# Boeing Commercial Airplane Co., Seattle, Wash.

REDUCTION OF ACOUSTIC DISTURBANCES IN THE TEST SECTION OF SUPERSONIC WIND TUNNELS BY LAMINARIZING THEIR NOZZLE AND TEST SECTION WALL BOUNDARY LAYERS BY MEANS OF SUCTION Final Report

W. Pfenninger and J. Syberg Washington NASA Nov. 1974 307 p refs

(Contract NASw-2359)

(NASA-CR-2436; D6-41564) Avail: NTIS HC $9.25 CSCL 14B

The feasibility of quiet, suction laminarized, high Reynolds number (Re) supersonic wind tunnel nozzles was studied. According to nozzle wall boundary layer development and stability studies, relatively weak area suction can prevent amplified nozzle wall TS (Tollmien-Schlichting) boundary layer oscillations. Stronger suction is needed in and shortly upstream of the supersonic concave curvature nozzle area to avoid transition due to amplified TG (Taylor-Goertler) vortices. To control TG instability, moderately rapid and slow expansion nozzles require smaller total suction rates than rapid expansion nozzles, at the cost of larger nozzle length Re and increased TS disturbances. Test section mean flow irregularities can be minimized with suction through longitudinal or highly swept slots (swept behind local Mach cone) as well as finely perforated surfaces. Longitudinal slot suction is optimized when the suction-induced crossflow velocity increases linearly with surface distance from the slot attachment line toward the slot (through suitable slot geometry). Suction in supersonic blowdown tunnels may be operated by one or several individual vacuum spheres. Author

N75-12978# National Aviation Facilities Experimental Center, Atlantic City, N.J.

REDUCTION OF VOLTAGE STANDING WAVE RATIO ON DOPPLER VERY HIGH FREQUENCY OMNIRANGE Final Report, Aug. - Oct. 1973

Wayne E. Bell Apr. 1974 12 p

(FAA Proj. 041-305-000)

(AD-777624; FAA-RD-74-45; FAA-NA-73-107) Avail: NTIS HC $3.00

An investigation, into the cause of increased voltage standing wave ratio (VSWR) in Doppler very high frequency omnirange (VOR) carrier, sideband, and goniometer feedlines, is described. The results of the investigation show that the VSWR tolerances listed in paragraph 227b(3), of Handbook 6790.4, can be achieved when: (1) a 54.7 deg modulation bridge is used, (2) making goniometer feedline VSWR measurements and the carrier feedline

is terminated in a dummy load, and (3) a stub positioner section is used with the L14 stub in the sideband feedline.
Author

N75-12979# Federal Aviation Administration, Washington, D.C. Systems Research and Development Service.
DUAL LANE RUNWAY STUDY Final Report, Jan. 1971 - Jan. 1974
Jack Clark, Carl Ball, Myles Reynolds, Jerry Gibson, and Jack Burke May 1974 16 p
(FAA Proj. 082-421-214)
(AD-779496; FAA-RD-74-80) Avail: NTIS HC $3.00

An interservice adhoc dual lane runway (DLRW) committee was established in January 1971, to develop, evaluate, and demonstrate dual lane runway design criteria, modes of operation and site selection criteria. In support of this effort, data were collected on dual lane runway operations at Cleveland Hopkins, Boston Logan, Los Angeles International, and Atlanta Hartsfield International Airports. The Lincoln Laboratory of MIT was employed to conduct real time (man-in-the-loop) and fast time (canned program) computer simulations of dual lane runway configurations and operation strategies. The bulk of the work dealt with using one runway for arrivals only and one runway for departures only. The dual lane analysis was extended by the Airport Design Branch to include modes of operation where both runways were used for arrivals and one or more runways for departures. A model predicting potential missed approaches was used for this effort. Data presented here summarize the finding of Lincoln Laboratory and the Airport Design Branch, and make recommendations to the agency concerning the design, location and operation of dual lane runways. Author

N75-12980# Hazeltine Corp., Greenlawn, N.Y.
MICROWAVE LANDING SYSTEM (MLS) DEVELOPMENT PLAN AS PROPOSED BY HAZELTINE CORPORATION DURING THE TECHNIQUE ANALYSIS AND CONTRACT DEFINITION PHASE OF THE NATIONAL MLS DEVELOPMENT PROGRAM. VOLUME 1: SYSTEM CONCEPT AND INTEGRATION
27 Sep. 1973 425 p
(Contract DOT-FA72WA-2804; FAA Proj. 075-325-013)
(AD-778215; FAA-RD-73-185-Vol-1) Avail: NTIS HC $9.00

The design and operational concept of a microwave landing system are discussed. The baseline system is designed to provide the very low angle coverage as required by the use of vertical directivity. The major features include the provision of planar coordinates from unitary Doppler antennas, which do not require airborne computation. A modular approach is provided to permit the separation of conventional takeoff and landing aircraft and short takeoff and landing operations as required. A special feature of the baseline approach is pattern emphasis, or increased reference antennas gain, along the runway centerline so as to reduce illumination of multipath sources to the side of the runway centerline. Author

N75-12981# Hazeltine Corp., Greenlawn, N.Y.
MICROWAVE LANDING SYSTEM (MLS) DEVELOPMENT PLAN AS PROPOSED BY HAZELTINE CORPORATION DURING THE TECHNIQUE ANALYSIS AND CONTRACT DEFINITION PHASE OF THE NATIONAL MLS DEVELOPMENT PROGRAM. VOLUME 2: MULTIPATH, SHADOWING
27 Sep. 1973 608 p
(Contract DOT-FA72WA-2804; FAA Proj. 075-325-013)
(AD-778118; FAA-RD-73-185-Vol-2) Avail: NTIS HC $13.00

The design and operational aspects of a Doppler microwave landing system are discussed. Emphasis is placed on the problems created by multipath, shadowing, and terrain considerations. The proposed method for reducing the errors caused by multipath transmission is explained. Diagrams of the systems components and the antennas radiation patterns are provided to explain the propagation problems. Mathematical models are included to support the theoretical presentation. Author

N75-12982# Federal Aviation Administration, Washington, D.C. Systems Research and Development Service.
INTERNATIONAL MICROWAVE LANDING SYSTEM (MLS) SYMPOSIUM
Apr. 1974 471 p refs Presented at the Intern. Microwave Landing System Symp., Washington, D. C., 30 Nov. - 4 Dec. 1973
(AD-779312; FAA-RD-74-56) Avail: NTIS HC $9.25

The proceedings of a symposium on international microwave landing systems are presented. The research and development programs conducted by various European countries, England, Australia, and the United States are discussed. The operating characteristics of the various systems are analyzed and the functions of the system components are reported. The advantages of the various systems are explained. For individual titles, see N75-12983 through N75-13000.

N75-12983 Service Technique de la Navigation Aerienne, Paris (France). Radiocommunication and Navigation Dept.
PRESENTATION OF A DIFFERENT MLS CONCEPT
Olivier Carel *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 5 p (For availability see N75-12982 04-09)

The development and operation of a ground derived instrument landing system are discussed. The system is under development in France. The equipment is compatible with an air-ground data link function for air traffic control purposes. The ground derived system uses a signal transmitted from the aircraft, the ground station locates the aircraft and sends its position through a coded information channel. Sensors are installed on the airport and measured data concerning the aircraft position and direction can be processed in such a way that the aircraft will receive angle and distance information from standard origins. Author

N75-12984 Service Technique de la Navigation Aerienne, Paris (France).
A TIME ORDERED ACCESS GROUND DERIVED MLS CONCEPT
J. Lovet *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 26 p (For availability see N75-12982 04-09)

The functional characteristics, technical characteristics, and research and development program for a microwave landing system based on a time-ordered access, ground-derived concept are discussed. The time ordered access ground derived system is organized by the ground station. It is therefore possible to avoid garbling on the air-ground link, while using this channel to a maximum. The ground-air data link carries transmission instructions and sends back measurements made on the ground. The techniques for angular measurements depend on interferometer and Doppler systems. Diagrams of the system are provided and an example of the system in use is analyzed. Author

N75-12985 Civil Aviation Administration, London (England).
UNITED KINGDOM PROPOSAL FOR A FUTURE ICAO PRECISION APPROACH AND LANDING GUIDANCE SYSTEM
Mike F. Whitney *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 7 p (For availability see N75-12982 04-09)

A research and development program for an instrument landing system is discussed. The program investigated aspects of microwave landing systems such as: (1) non-commutative Doppler scanning-beam techniques, (2) conventional scanning beam techniques, (3) air-derived ranging systems, (4) microwave propagation, (5) instrument landing system and microwave landing system colocation, (6) terminal area interface, and (7) interferometric techniques for aircraft guidance. A projected time table for accomplishing the various phases of the research project is provided. Author

N75-12986 Royal Aircraft Establishment, Farnborough (England). Radio Dept.
MAJOR RESULTS OF THE ROYAL AIRCRAFT ESTABLISHMENT PHASE 1 AND PHASE 2a PROGRAMMES
J. M. Jones *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 40 p (For availability see N75-12982 04-09)

Performance tests of microwave instrument landing systems based on automatic approach control are discussed. Tests were conducted of (1) flight elevation system, (2) azimuth tracking system, (3) runway profile effects, (4) instrument landing system substitution, (5) effects of multiplexing, and (6) signal propagation measurements. Diagrams of the systems and the method of operation are provided. Author

N75-12987 Plessey Radar Ltd., Havant (England).
UNITED KINGDOM PHASE 2 PROGRAMME
Ronald S. Barratt *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 28 p (For availability see N75-12982 04-09)

The development and characteristics of a commutated Doppler aircraft landing system are discussed. The Doppler approach provides a continuous signal and a natural self coding of space, as a function of the receiver's angular position. The basic elements of the system and other facilities to be added to the basic system satisfy more demanding environments. The test equipment used in the evaluation and the procedures for conducting the tests are reported. Author

N75-12988 Royal Aircraft Establishment, Farnborough (England).
UNITED KINGDOM MLS PROGRAMME: PHASE 2 FEASIBILITY DEMONSTRATION TRIALS PROGRAMME
J. M. Jones *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 7 p refs (For availability see N75-12982 04-09)

An evaluation program for the feasibility demonstration of a microwave landing system is described. Tests were conducted on individual subsystems and total system performance using ground and airborne measurements. The tracking facilities, timing equipment, and flight profiles are defined. A diagram of the airport is provided to show the location of the system components. A schedule of the tests is included. Author

N75-12989 Department of Civil Aviation, Melbourne (Australia).
INTERSCAN: A NEW NON-VISUAL PRECISION APPROACH AND LANDING GUIDANCE SYSTEM FOR INTERNATIONAL CIVIL AVIATION
Egon Stern and J. P. Wild (CSIRO) *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 35 p refs (For availability see N75-12982 04-09)

The development and characteristics of a nonvisual aircraft instrument landing system are discussed. The system is based on the use of a scanning beam antenna for transmitting the azimuth, elevation, and flare guidance from ground based subsystems. The signal format for the five guidance functions is analyzed. The configuration of the complete system is diagrammed to show the location of the components along the runway. A time schedule of the flight test activities is presented. Author

N75-12990 Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany).
THE GERMAN MLS PROGRAM: DLS, DME BASED LANDING SYSTEM INTRODUCTION AND PROGRAM OVERVIEW
Tilman H. Bohr *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 13 p (For availability see N75-12982 04-09)

The characteristics of a distance measuring equipment based landing system (DLS) are described. The system provides a mixture of ground derived data (azimuth and elevation) and air derived data. These data are exchanged in such a way that the relevant data are available in the air as well as on the ground. The time schedule for the development program is analyzed and the goals of the research program are defined. Author

N75-12991 Standard Electrik Lorenz A.G., Stuttgart (West Germany).
SYSTEM PRESENTATION (STATUS)
Manfred Boehm *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 29 p (For availability see N75-12982 04-09)

The concept and operation of the distance measuring landing systems (DLS) are explained. The basic signal flow of the system is illustrated. The distance measuring interrogations are measured with regard to their angles of incidence by two ground stations, one being the azimuth station and the other being the elevation station. The distance measuring equipment replies transmitted by the azimuth station are used to carry the angle information back to the interrogation aircraft. The elevation station employs, in addition to the circular array, a linear vertical array, which provides the conical information, and together with the cosine components of the horizontal circular array, the planar elevation. The horizontal circular array provides the flare azimuth. Components of the system are diagrammed to show the principles of operation. Author

N75-12992 Standard Electrik Lorenz A.G., Stuttgart (West Germany).
TECHNOLOGY OVERVIEW
Guenter Peuker *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 18 p (For availability see N75-12982 04-09)

The technology aspects of the distance measuring equipment landing system (DLS) are discussed. The transfer of technology from previous systems to the current development is described. The ground based and airborne components of the system are analyzed to show the interrelated functions. Photographs of the components are provided. Author

N75-12993 Ministry of Transport, Ottawa (Ontario).
STOL DEMONSTRATION PROGRAM: CANADA
G. J. Taylor *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 10 p (For availability see N75-12982 04-09)

Performance tests of a microwave landing system for short takeoff aircraft are discussed. The tests include the following: (1) measurements of absolute signal strength, (2) refracted signals, and (3) the effects of snow, ice, and snow banks along the runway. Communications equipment tests to determine applications for microwave propagation data and to identify the propagation problems with emphasis on refraction and precipitation effects are reported. Author

N75-12994 Hazeltine Corp., Greenlawn, N.Y.
DOPPLER MICROWAVE LANDING SYSTEM AS DEVELOPED BY HAZELTINE CORPORATION
Henry W. Redlien *In* FAA Intern. Microwave Landing System (MLS) Apr. 1974 38 p (For availability see N75-12982 04-09)

The development of a microwave landing system based on the Doppler principle is discussed. The objectives of the feasibility demonstration of the system are defined. Emphasis is placed on an engineering approach which permits providing the high performance and accuracy required in the high density terminal and at the same time permits the design of low-cost airborne and ground equipment for general aviation and small airports. Diagrams of the equipment and typical airport installations are provided to show the nature of the limited and full scale capabilities. The types of antennas used in the system are described and drawings of their configurations are included. Author

N75-12995 ITT Gilfillan, Inc., Van Nuys, Calif.
THE ITT GILFILLAN DOPPLER MICROWAVE LANDING SYSTEM
R. E. Hull, Ronald A. Rosien, and Lon L. Sanders *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 24 p (For availability see N75-12982 04-09)
(Contract DOT-FA72WA-2805)

The development and characteristics of a Doppler microwave landing system are discussed. The major decisions and system engineering considerations are shown as: (1) commutated Doppler application, (2) all C-band format, (3) conical antenna types, (4) equipment modularity, and (5) time division multiplex format. The decisions related to the means of providing flare guidance are explained. Diagrams of the flare guidance element are shown to describe the operational limitations. Photographs of the system modules are provided. Author

N75-12996 Bendix Corp., Towson, Md.
THE BENDIX MICROWAVE LANDING SYSTEM (MLS)
E. D. Hart and Robert Kelly *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 42 p refs (For availability see N75-12982 04-09)

The characteristics of a microwave landing system using air derived data system techniques operating at C-band microwave frequencies are discussed. Angular position of the aircraft is measured by reference to ground generated fan beams that are electronically scanned in their narrow direction across broad coverage sectors in both azimuth and elevation. An airborne receiver/processor extracts modulated angle data, corresponding to the line-of-sight angle, from the ground scanning beam antenna to the aircraft. Range measurements are made by airborne

interrogation of a ground distance measuring transponder. An aircraft can obtain precision azimuth angle, elevation angle, range and range rate data referenced to a runway, suitable for visual display to a pilot or as automatic inputs to the flight control system. Author

N75-12997 Texas Instruments, Inc., Dallas.
THE TEXAS INSTRUMENT MICROWAVE LANDING SYSTEM
R. M. Lockerd *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 73 p (For availability see N75-12982 04-09)

The development and operation of a microwave landing system are discussed. The basic guidance technique uses scanned fan beams with angle information encoded on a frequency modulated subcarrier with the range system being a high precision C-band distance measuring equipment. A diagram of a typical airport installation is provided. The most important characteristic of the system is the performance of the equipment in the multipath environment. The primary causes of electromagnetic interference are identified and the methods for reducing the interference effects are described. Performance tests of the system were conducted and preliminary results are tabulated. Author

N75-12998 Air Transport Association of America, Washington, D.C.
THOUGHTS ABOUT THE MICROWAVE LANDING SYSTEM FROM A USER PERSPECTIVE
S. B. Poritzky *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 12 p (For availability see N75-12982 04-09)

The desired characteristics of microwave landing systems are described. The performance of air-derived data system is compared with the performance of ground-derived data systems. The rationale for the development of microwave landing systems to replace the conventional instrument landing systems is analyzed. The types of systems which will provide the minimum capability for airports in underdeveloped nations are examined. Author

N75-12999 British Airways, Middlesex (England).
AN INTERNATIONAL OPERATORS VIEW ON MLS
G. E. Selves *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 11 p (For availability see N75-12982 04-09)

Operational views to be considered by designers of approach and landing guidance systems for aircraft are expressed. The operational views are presented from the standpoint of the international operator and a member airline are analyzed. It is stated that the long term objective for operators is to install airborne systems that provide that ability to navigate with the minimum reliance on ground based facilities to include the approach and landing phase. The limitations of the present instrument landing systems are analyzed. A tabulation of the radio aids currently installed in civil aircraft for international operation is provided. Diagrams of typical aircraft are included to show the location and types of communication and navigation equipment installed. Author

N75-13000 Lincoln Lab., Mass. Inst. of Tech., Lexington.
SYSTEM SELECTION CONSIDERATIONS
James E. Evans *In* FAA Intern. Microwave Landing System (MLS) Symp. Apr. 1974 46 p (For availability see N75-12982 04-09)

The considerations involved in the development and operation of microwave landing systems are analyzed. The economic aspects of the systems are investigated. Specific technical problems which are discussed are: (1) traffic capacity, (2) frequency allocations, (3) propagation effects in a multipath environment, (4) data rate, and (5) reliability and integrity of the system. Diagrams of the electromagnetic radiation features of the microwave landing system are provided. Author

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N75-13001*# Scientific Translation Service, Santa Barbara, Calif.
MECHANICS OF FLIGHT TO DISTANT PLANETS
V. I. Levantovskiy Washington NASA Dec. 1974 70 p Transl. into ENGLISH of the monograph "Mekhanika Poleta k Dalekim Planetam" Moscow, Znaniye Press, 1974 64 p
(Contract NASw-2483)
(NASA-TT-F-16007) Avail: NTIS HC $4.25 CSCL 22A

The problems of interplanetary flight are discussed. Flight to the distant planets of the solar system, Jupiter, Saturn, Uranus, Neptune, and Pluto, as well as their natural satellites is considered. Author

N75-13002*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
[SUMMARY OF SPACECRAFT TECHNOLOGY, SYSTEMS RELIABILITY, AND TRACKING DATA ACQUISITION] Annual Report, 1973
1973 75 p
(NASA-TM-X-72534) Avail: NTIS HC $4.25 CSCL 22A

Goddard activities are reported for 1973. An eight-year flight schedule for projected space missions is presented. Data acquired by spacecraft in the following disciplines are described: stellar ultraviolet, stellar X-rays, stellar gamma rays, solar radiation, radio astronomy, particles/fields, magnetosphere, aurora, and the upper atmosphere. F.O.S.

N75-13003*# Aerospace Corp., El Segundo, Calif. Space Physics Lab.
A ROCKET SPECTROSCOPIC PAYLOAD IN SUPPORT OF THE APOLLO TELESCOPE MOUNT EXPERIMENTS Final Report
H. R. Rugge 5 Jul. 1974 80 p
(Contract NASw-2361)
(NASA-CR-141117; ATR-74(7282)-1) Avail: NTIS HC $4.75 CSCL 22C

The scientific instrumentation and other payload systems of a solar rocket experiment are described in detail. The objectives of the rocket payload were: (1) to carry out high-spectral-resolution measurements of a coronal active region in the X-ray and extreme ultraviolet regions at the same time as high-spatial-resolution measurements were being made of the same active region by the Apollo Telescope Mount experiments flown on Skylab; and (2) to derive a physical model of the conditions in the coronal active regions, which dominate the X-ray spectrum of the nonflaring active sun, on the basis of data obtained from both the rocket instrumentation and several of the Apollo Telescope Mount experiments. Author

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N75-13004*# Scientific Translation Service, Santa Barbara, Calif.
MUTUAL AID IN SPACE ORBITS
N. Fotkin Washington NASA Dec. 1974 14 p Transl. into ENGLISH from Krylya Rodiny (USSR), no. 1, 1974 p 34-36
(Contract NASw-2483)
(NASA-TT-F-16088) Avail: NTIS HC $3.25 CSCL 22A

A detailed description of the Apollo-Soyuz docking mechanism, docking module, and radio communication procedure is provided. The purpose of the joint docking project is to create the ultimate backup system, another spacecraft which can be sent to replace or aid the first. The exchange of pilot-cosmonauts and astronauts, which will also take place, is part of this backup system. Author

N75-13005*# Rockwell International Corp., Downey, Calif. Crew Training and Procedures Div.
APOLLO-SOYUZ TEST PROJECT. OPERATIONS HANDBOOK COMMAND/SERVICE/DOCKING MODULES (CSM 119/DM 1): OPERATIONAL PROCEDURES REFERENCE ISSUE
15 Jul. 1974 802 p refs
(Contract NAS9-13100)
(NASA-CR-140311; SD-74-CS-0026; JSC-09092) Avail: NTIS HC $17.25 CSCL 22A

Operational and configuration checks for the Apollo-Soyuz

Test Project are presented. The checks include: backup crew prelaunch, prime crew prelaunch, boost and insertion, G and C reference data, G and N reference modes, rendezvous, navigation, Apollo-Soyuz operations, abort procedures, and emergency procedures. F.O.S.

N75-13006# Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
ORBITAL LIFETIME ESTIMATES
L. L. Perini Feb. 1974 54 p refs Sponsored by AEC
(ANSP-M-8) Avail: NTIS HC $4.25

Orbital lifetime estimates for long lifetimes (>30 y) are presented for initial eccentricities from 0 to 0.95 and for perigee altitudes from 200 to 1600 km. The lifetime estimates are based on a semianalytic form of the equations of motion developed by King-Hele and the latest (1971) Jacchia atmospheric model. A mean 11 y solar cycle based on historical records of the Zurich sunspot number is employed in the calculations. Comparisons are made to previously published lifetime charts. Author (NSA)

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N75-13007* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REMOTE PLATFORM POWER CONSERVING SYSTEM Patent
Charles W. Kurvin, inventor (to NASA) (Radiation, Inc., Melbourne, Fla.) Issued 26 Nov. 1974 9 p Filed 31 Aug. 1973 Supersedes N73-32769 (11 - 23, p 2849) Sponsored by NASA
(NASA-Case-GSC-11182-1; US-Patent-3,851,250; US-Patent-Appl-SN-393527; US-Patent-Class-325-4) Avail: US Patent Office CSCL 22B

A system is described where an unattended receiver and transmitter equipped data collection platform is interrogated by a substantially polar orbiting satellite. The method and apparatus involve physically representing the orbit of the satellite and the spin of the planetary body with timers, and using these representations to turn on the platform's receiver only when the satellite should be in radio range of the platform, whereby battery power at the platform is conserved.
Official Gazette of the U.S. Patent Office

N75-13008 Iowa State Univ. of Science and Technology, Ames.
RELATIVE POSITIONING BY NAVIGATION SATELLITE USING DOPPLER SHIFTS AND PROPAGATION DELAYS AS OBSERVABLES Ph.D. Thesis
Lorys Ascher 1974 69 p
Avail: Univ. Microfilms Order No. 74-23719

A study, using simulation methods, was made to determine how much improvement in accuracy time lag measurements make for absolute and relative positioning of two receivers. Simulation runs indicate that there should be a great improvement in accuracy for both absolute and relative positioning. For relative positioning, Doppler data could be left out entirely since simulation indicates that using time measurements alone gives nearly as good results as using both time and Doppler measurements. This would simplify the receivers and the associated data processing. When using time measurements only, simulation shows that neglecting the satellite position errors in the filtering process does not significantly affect performance. This could further simplify the software part of the system. A striking result is that accurate initial synchronization of the two clocks is not necessary. Dissert. Abstr.

N75-13009*# General Dynamics/Convair, San Diego, Calif.
TITAN 3E/CENTAUR D-1T SYSTEMS SUMMARY
Sep. 1973 264 p Prepared in cooperation with Martin Marietta Aerospace, Denver, Colo.
(Contracts NAS3-13514; NAS3-16082)
(NASA-CR-141014; CASD-LVP73-007) Avail: NTIS HC $8.50 CSCL 22B

A systems and operational summary of the Titan 3E/Centaur D-1T program is presented which describes vehicle assembly facilities, launch facilities, and management responsibilities, and also provides detailed information on the following separate systems: (1) mechanical systems, including structural components, insulation, propulsion units, reaction control, thrust vector control, hydraulic systems, and pneumatic equipment; (2) astrionics systems, such as instrumentation and telemetry, navigation and guidance, C-Band tracking system, and range safety command system; (3) digital computer unit software; (4) flight control systems; (5) electrical/electronic systems; and (6) ground support equipment, including checkout equipment. A.A.D.

N75-13010# Committee on Aeronautical and Space Sciences (U. S. Senate).
EARTH RESOURCES SATELLITES
Washington GPO 1974 341 p refs Hearings on S. 2350 and S. 3484 before Comm. on Aeron. and Space Sci., 93d Congr., 2d Sess., 6, 8, and 9 Aug. and 18 Sep. 1974
(GPO-40-560) Avail: SOD HC $3.00

The arguments for and against the expansion of earth resources satellite capabilities and preparation for an operational satellite system were presented in a hearing before Congress whose purpose was to gather information on two impending bills which would increase the federal government's activities in remote sensing programs. Significant accomplishments of ERTS 1 are reviewed, along with some potential capabilities which are as yet unexplored. The ways in which ERTS data is being used are also described, with emphasis on the role of the EROS Data Center in Sioux Falls, S. Dak. in disseminating information of use to farmers, environmental experts, regional planners, and researchers. Plans for an operational earth resources satellite system, which is expected to become a more pressing issue with the launch of ERTS-B, are discussed in terms of public vs. private control and the possibility that such a system will present difficulties in foreign relations. A.A.D.

N75-13011# Academy of Sciences (USSR), Moscow.
RESULTS OF THE OBSERVATIONS OF ARTIFICIAL EARTH SATELLITES, NO. 21 (161), EXPLORER 39, 1968-66-I (VISUAL OBSERVATIONS, EQUATORIAL COORDINATES (1950.0)) (JANUARY - APRIL 1973)
I. I. Katrovskaya, ed. 1974 60 p In RUSSIAN
Avail: NTIS HC $4.25

The results of observations of Explorer 39 satellite are tabulated. The data consist of daily observations for the months of January through April 1973. Author

N75-13012# Academy of Sciences (USSR), Moscow.
RESULTS OF THE OBSERVATIONS OF ARTIFICIAL EARTH SATELLITES, NO. 22 (162), EXPLORER 39, 1968-66-I (VISUAL OBSERVATIONS, EQUATORIAL COORDINATES (1950.0)) (APRIL - AUGUST 1973)
I. I. Katrovskaya, ed. 1974 57 p In RUSSIAN
Avail: NTIS HC $4.25

The results of observations of Explorer 39 satellite are tabulated. The data consist of daily observations for the months of April through August 1973. Author

N75-13013# Academy of Sciences (USSR), Moscow.
RESULTS OF THE OBSERVATIONS OF ARTIFICIAL EARTH

SATELLITES, NO. 23 (163), EXPLORER 19, 1963-53-I (VISUAL OBSERVATIONS, EQUATORIAL COORDINATES (1950.0)) (JANUARY - JUNE 1973)
I. I. Katrovskaya, ed. 1974 64 p In RUSSIAN
Avail: NTIS HC $4.25

The results of observations of Explorer 39 satellite are tabulated. The data consist of daily observations for the months of January through June 1973. Author

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

No abstracts in this category.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N75-13014 Ohio State Univ., Columbus.
A STUDY OF GUIDANCE CONTROLLERS FOR HOMING MISSILES Ph.D. Thesis
Larry Allen Stockum 1974 312 p
Avail: Univ. Microfilms Order No. 74-24409

Optimal, suboptimal, and proportional navigation guidance laws for short-range homing missiles are developed and evaluated and evasive target guidance laws for evading a homing missile steered by proportional navigation are derived. A two-dimensional, linear model is used to represent the missile-target geometry and kinematics. An underdamped, second-order transfer function is used to relate the actual missile lateral acceleration to the commanded acceleration; the target dynamics are considered to be either ideal or represented by a first-order lag. The Minimum Principle of Pontryagin is used to derive an optimal missile guidance controller for a missile with unlimited acceleration capability. The performance criterion for optimization is minimization of the final miss distance squared plus an integral quadratic of the control. The resulting optimal controller is a feedback regulator with time-varying gains. Dissert. Abstr.

N75-13015*# Avco Corp., Nashville, Tenn. Aerostructures Div.
HOT VACUUM CREEP FORMING OF SCALE SHUTTLE EXTERNAL TANK DOME CAPS Final Technical Report
A. O. Thomas 12 Sep. 1974 37 p
(Contract NAS8-30664)
(NASA-CR-120542; R-1131) Avail: NTIS HC $3.75 CSCL 22B

The feasibility of forming shuttle external tank dome caps by hot vacuum creep was investigated for a sub-scale configuration. Aluminum 2219-T37 at an elevated temperature equivalent to the artificial aging time and temperature was used to produce the T87 condition while achieving MIL-HBK -5 properties of 2219-T87 aluminum alloy material. A feasibility analysis was conducted in two phases: the design and build of a sub-scale hot vacuum creep forming (HVCF) die and the forming evaluation of various cap configurations. The contour was constant in all evaluations. This configuration was found to be too severe for the limited forming force available by HVCF. Author

N75-13016*# TRW Systems Group, Redondo Beach, Calif.
SPACE SHUTTLE SORTIE PAYLOAD CREW SAFETY AND SYSTEMS COMPATIBILITY CRITERIA. VOLUME 1: EXECUTIVE SUMMARY Final Report
15 May 1973 20 p refs
(Contracts NAS9-12741; NAS9-12742)
(NASA-CR-128952; TRW-22214-22215-H013-RO-00) Avail: NTIS HC $3.25 CSCL 22B

As part of the effort to reduce the costs of shuttle payloads, this study was performed to determine the minimum, mandatory design and verification criteria necessary to insure that sortie payloads are compatible with the space shuttle system; distinguishing them from those criteria related primarily to mission success, configuration choices, management prerogatives, or other cost-benefit variables which are, therefore, discretionary to payload project management. It was concluded that utilization of the mandatory design criteria, presented in this report, as the basis for sortie payload specifications will produce basic systems compatibility between the orbiter and its sortie payloads at reduced costs. Also, when additional criteria are generated due to changes in subsystems, designs, or guidelines, the categorization methodology developed can aid managerial decision-making concerning these criteria. To a limited degree, the compatibility criteria as defined in this study reflect a portion of the total system safety effort involved in a manned space program. Author

N75-13017*# TRW Systems Group, Redondo Beach, Calif.
SPACE SHUTTLE SORTIE PAYLOAD CREW SAFETY AND SYSTEMS COMPATIBILITY CRITERIA. VOLUME 2: CREW SAFETY DESIGN AND VERIFICATION CRITERIA Final Report
J. Griggs, III 15 May 1973 90 p refs
(Contract NAS9-12742)
(NASA-CR-128956; TRW-22214-H014-RO-00-Vol-2) Avail: NTIS HC $4.75 CSCL 22B
For abstract, see N75-13438.

N75-13018*# TRW Systems Group, Redondo Beach, Calif.
SPACE SHUTTLE SORTIE PAYLOAD CREW SAFETY AND SYSTEMS COMPATIBILITY CRITERIA. VOLUME 3: SYSTEMS COMPATIBILITY DESIGN AND VERIFICATION CRITERIA Final Report
David E. Wilson 15 May 1973 74 p refs
(Contract NAS9-12741)
(NASA-CR-128957; TRW-22215-H014-RO-00-Vol-3) Avail: NTIS HC $4.25 CSCL 22B
For abstract, see N75-13016.

N75-13019*# Hughes Aircraft Co., Los Angeles, Calif. Space and Communications Group.
DESIGN ANALYSIS AND COMPUTER-AIDED PERFORMANCE EVALUATION OF SHUTTLE ORBITER ELECTRICAL POWER SYSTEM. VOLUME 2: SYSTID USER'S GUIDE Final Report
Oct. 1974 91 p
(Contract NAS9-13779)
(NASA-CR-140383; S-3-74-085-Vol-2; D1191-Vol-2) Avail: NTIS HC $4.75 CSCL 22B

The manual for the use of the computer program SYSTID under the Univac operating system is presented. The computer program is used in the simulation and evaluation of the space shuttle orbiter electric power supply. The models described in the handbook are those which were available in the original versions of SYSTID. The subjects discussed are: (1) program

description, (2) input language, (3) node typing, (4) problem submission, and (5) basic and power system SYSTID libraries.
Author

N75-13020*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
INFLUENCE OF CONFIGURATION DETAILS ON THE SUBSONIC CHARACTERISTICS OF A SPACE SHUTTLE ORBITER DESIGN
John P. Decker and W. Pelham Phillips Washington Dec. 1974 29 p refs
(NASA-TM-X-3159; L-9722) Avail: NTIS HC $3.75 CSCL 22B

An investigation was conducted in the Langley low-turbulence pressure tunnel of a model of a space shuttle orbiter design in order to determine the influence of minor configuration geometric details on the aerodynamic characteristics at subsonic speeds. A plane wing was tested with a small planform fillet; a twisted wing was tested with both a small and a large planform fillet. Tailored attitude-control propulsion-system wing-tip and body pods, trisegmented elevons, and canopy effects were also investigated. The tests were conducted at angles of attack from -3 deg to 24 deg for sideslip angles of 0 deg and 6 deg and at a Mach number of 0.25. Author

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N75-13021*# Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
THE 15 cm DIAMETER ION THRUSTER RESEARCH Annual Report, 1 Dec. 1973 - 1 Dec. 1974
Paul J. Wilbur Dec. 1974 92 p refs
(Grant NGR-06-002-112)
(NASA-CR-134755) Avail: NTIS HC $4.75 CSCL 21C

The startup reliability of a 15 cm diameter mercury bombardment ion thruster which employs a pulsed high voltage tickler electrode on the main and neutralizer cathodes is examined. Startup of the thruster is achieved 100% of the time on the main cathode and 98.7% of the time on the neutralizer cathode over a 3640 cycle test. The thruster was started from a 20 C initial condition and operated for an hour at a 600 mA beam current. An energy efficiency of 75% and a propellant utilization efficiency of 77% was achieved over the complete cycle. The effect of a single cusp magnetic field thruster length on its performance is discussed. Guidelines are formulated for the shaping of magnetic field lines in thrusters. A model describing double ion production in mercury discharges is presented. The production route is shown to occur through the single ionic ground state. Photographs of the interior of an operating-hollow cathode are presented. A cathode spot is shown to be present if the cathode is free of low work-function surfaces. The spot is observed if a low work-function oxide coating is applied to the cathode insert. Results show that low work-function oxide coatings tend to migrate during thruster operation. Author

N75-13022*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LIQUID ROCKET METAL TANKS AND TANK COMPONENTS NASA Space Vehicle Design Criteria (Chemical Propulsion)
W. A. Wagner and Russell B. Keller, ed. May 1974 165 p refs
(NASA-SP-8088) Avail: NTIS HC $6.25 CSCL 22B

Significant guidelines are presented for the successful design of aerospace tanks and tank components, such as expulsion devices, standpipes, and baffles. The state of the art is reviewed, and the design criteria are presented along with recommended practices. Design monographs are listed. F.O.S.

N75-13023*# Bureau of Mines, Pittsburgh, Pa. Mining and Safety Research Center.
THE HARD START PHENOMENA IN HYPERGOLIC ENGINES. VOLUME 3: PHYSICAL AND COMBUSTION CHARACTERISTICS OF ENGINE RESIDUALS Interim Report
Yael Miron and H. E. Perlee 22 Mar. 1974 100 p refs
(NASA Order T-39882-G)
(NASA-CR-140361; BM-IR-1646) Avail: NTIS HC $4.75 CSCL 21H

An investigation was conducted to determine the cause of starting problems in the hypergolic rocket engines of the Apollo reaction control (RCS) engines. The scope of the investigation was as follows: (1) to establish that chemical reactions occurred during the preignition and post combustion periods, (2) to identify the chemical species of the products of preignition and post combustion reaction, and (3) to determine the explosive nature of the identified species. The methods used in identifying the chemical products are described species. The infrared spectra, X-ray spectra, and other signatures of the compounds are presented. The physical and explosion characteristics of various hypergolic agents are reported. Author

N75-13024*# Bureau of Mines, Pittsburgh, Pa. Mining and Safety Research Center.
THE HARD START PHENOMENA IN HYPERGOLIC ENGINES. VOLUME 4: THE CHEMISTRY OF HYDRAZINE FUELS AND NITROGEN TETROXIDE PROPELLANT SYSTEMS Interim Report
Yael Miron and Henry E. Perlee 22 Mar. 1974 86 p refs
(NASA Order T-39882-G)
(NASA-CR-140360; BM-IR-1646) Avail: NTIS HC $4.75 CSCL 21H

The various chemical reactions that occur and that could possibly occur in the RCS engines utilizing hydrazine-type fuel/nitrogen tetroxide propellant systems, prior to ignition (preignition), during combustion, and after combustion (postcombustion), and endeavors to relate the hard-start phenomenon to some of these reactions are discussed. The discussion is based on studies utilizing a variety of experimental techniques and apparatus as well as current theories of chemical reactions and reaction kinetics. The chemical reactions were studied in low pressure gas flow reactors, low temperature homogeneous- and heterogeneous-phase reactors, simulated two-dimensional (2-D) engines, and scaled and full size engines. Author

N75-13025*# Bureau of Mines, Pittsburgh, Pa. Mining and Safety Research Center.
THE HARD START PHENOMENA IN HYPERGOLIC ENGINES. VOLUME 5: RCS ENGINE DEFORMATION AND DESTRUCT TESTS Interim Report
Yael Miron and H. E. Perlee 22 Mar. 1974 93 p refs
(NASA Order T-39882-G)
(NASA-CR-140359; BM-IR-1646) Avail: NTIS HC $4.75 CSCL 21H

Tests were conducted to determine the causes of Apollo Reaction Control (RCS) engine failures. Stainless steel engines constructed for use in the destructive tests are described. The tests conducted during the three phase investigation are discussed. It was determined that the explosive reaction that destroys the RCS engines occurs at the time of engine ignition and is apparently due to either the detonation of the heterogeneous constituents of the rocket engine, consisting primarily of unreacted propellant droplets and vapors, and/or the detonation of explosive materials accumulated on the engine walls from previous pulses. Pho-

tographs of the effects of explosions on the simulated RCS engines are provided. Author

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N75-13026*# Avco Corp., Lowell, Mass. Systems Div.
QUINOXALINE POLYMERS AND COPOLYMERS DERIVED FROM 1, 4-BIS(1'-NAPTHALENYLOXAYL) BENZENE Final Report, 9 May 1973 - 9 Jul. 1974
W. S. Port and R. C. Loszewski Nov. 1974 109 p refs
(Contract NAS3-16802)
(NASA-CR-134715; AVSD-0343-74-CR) Avail: NTIS HC $5.25 CSCL 07C

A route for the synthesis of a new monomer, 1,4-bis(1'-naphthalenyl)-oxayl benzene, was devised, and six polymers and copolymers were prepared from this monomer, 1,4-bis (phenyloaxaly)benzene, 3,3'-diaminobenzidine and 3,3',4,4'-tetraaminobenzophenone. Thermogravimetric analysis showed that decomposition of these quinoxaline polymers and copolymers sets in at about 500 C but does not become significant in an inert atmosphere below 600 C. Oxidation becomes significant at about 550 C and the phenylquinoxaline homopolymer is somewhat more oxidation resistant than is the 1-naphthalenylquinoxaline homopolymer. Stress-relaxation measurements showed that, with two exceptions, the homopolymers and copolymers exhibited two second-order transition temperatures, one at about 204.4 C (400 F) and the other at about 315.6 C (600 F). No gross differences in the high temperature plasticity was observed between the naphthalenyl- and the phenyl-quinoaxaline homopolymers. Work was begun on a method for cross-linking polyquinoxalines. A new monomer, p-(methyloxaly)benzil, was synthesized, and model reaction studies showed that cross-linking of 2-methylquinoxaline polymers by a Michael condensation with dimaleimides will probably occur. Author

N75-13027# Council for Scientific and Industrial Research, Pretoria (South Africa).
PRODUCTION OF POLYPARAFFINS FROM n-PARAFFIN HYDROCARBONS VIA POLYRECOMBINATION BY MEANS OF ORGANIC PEROXIDES
W. Kisielow and R. Klecan Jan. 1974 21 p refs Transl. into ENGLISH from Chemia Stosowana, v. 16, no. 4, 1972 p 453-468
(Rept-1137) Avail: NTIS HC $3.25

Polyrecombination of paraffin hydrocarbons, making use of the organic peroxides as a source of radicals initiating the reaction was carried out. The optimal conditions of the polyrecombination reaction as well as the properties and composition of reaction products were determined. Author

N75-13028# Los Alamos Scientific Lab., N.Mex.
HUGONIOT EQUATIONS OF STATE OF Li6H, Li6D, (Li SUPn)H, AND (Li SUPn) D
S. P. Marsh Jul. 1972 29 p refs Sponsored by AEC
(LA-4942) Avail: NTIS HC $3.75

An experimental value of 1.08 cu cm/g for (delta E/delta P) sub v was determined from the Hugoniot data on pressed Li6D of various porosities which agrees well with the thermodynamic value of (delta E/delta P) sub v. For each of the isotopic combinations of Li6H, LinH Li6D, and linD crystal-density Hugoniots and equations of state were calculated from Hugoniot data on pressed material having porosity of 5% or less and from the thermodynamic values of (delta E/delta P) sub v. No evidence of a polymorphic transition was observed. Ultrasonic measurements of longitudinal and shear-wave velocities in these materials pressed to near crystal density were obtained, and the isotropic elastic moduli were calculated. In addition, elastic contstants were determined for crystals of LinH, Li7D, and Li7H. Author (NSA)

N75-13029# Centre National de la Recherche Scientifique, Toulouse (France).
IDENTIFICATION AND ADAPTIVE CONTROL OF AN INDUSTRIAL POLYMERIZATION PROCESS Ph.D. Thesis - Toulouse Univ. [IDENTIFICATION ET REGULATION ADAPTIVE D'UN PROCESSUS INDUSTRIEL DE POLYMERISATION]
Gerard Continente 1974 154 p refs In FRENCH
(LAAS-Publ-1104) Avail: NTIS HC $6.25

An industrial polystyrene polymerization process was considered. An algorithm was developed for nonlinear continuous-discrete filtering. The polymerization process of polystyrene is described, leading to a nonlinear model and its simplification. A solution is proposed for the command of the polymerization process using estimated linear on-line models. ESRO

N75-13030# Bureau of Mines, Pittsburgh, Pa. Mining and Safety Research Center.
GAS CHROMATOGRAPHIC METHOD FOR ANALYZING GASES ASSOCIATED WITH COAL
Ann G. Kim and Louise J. Douglas Jun. 1974 14 p refs
(PB-234072/7; BM-RI-7903) Avail: NTIS HC $3.25 CSCL 07D

Gas samples containing oxygen, nitrogen, hydrogen, helium, carbon dioxide, carbon monoxide, methane and trace amounts of C2 to C5 were analyzed by a gas chromatographic method that utilizes both thermal conductivity and flame ionization detectors. Porapak and molecular sieve columns are used with argon as the carrier gas. A column selector valve makes it possible to perform a complete analysis on a one milliliter sample, or two samples may be used, one sample for each detector. Samples are introduced either by on-column injection or through a gas sampling valve. By varying operational parameters, the speed, sensitivity and accuracy of analysis may be modified to suit a particular situation. GRA

N75-13031# Naval Ordnance Lab., White Oak, Md.
THE THERMAL DECOMPOSITION OF THIRTY COMMERCIALLY AVAILABLE MATERIALS AT 300 C Final Report
Eleonore G. Kayser Feb. 1974 35 p refs
(Contract DOT-AS-30044)
(AD-783960; NOLTR-74-44) Avail: NTIS CSCL 07/1

A literature search of available thermochemical data of twenty-six organic and inorganic compounds tabulated in the Department of Transportation's commodity listing has been completed. Experiments have been carried out to measure the thermal sensitivity of these materials in laboratory tests using thermal surge stimuli, differential scanning calorimetry, and a system designed to determine qualitatively the percent decomposition of liquid and solid materials at the limiting parameters (one hour at 300 C). The amount of gas resulting from this thermal decomposition is also reported. (Modified author abstract) GRA

24 COMPOSITE MATERIALS

Includes laminates.

N75-13032* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
METHOD FOR MAKING CONDUCTORS FOR FERRITE MEMORY ARRAYS Patent
Clarence H. Heckler (Ampex Corp.), Paul D. Baba (Ampex Corp.), and Nutan C. Bhiwandker, inventors (to NASA) (Ampex Corp.) Issued 26 Nov. 1974 6 p Filed 22 Aug. 1973 Supersedes N73-30536 (11 - 21, p 2562) Sponsored by NASA
(NASA-Case-LAR-10994-1; US-Patent-3,849,877; US-Patent-Appl-SN-390466; US-Patent-Class-29-604; US-Patent-Class-29-420; US-Patent-Class-75-200; US-Patent-Class-340-174MA) Avail: US Patent Office CSCL 11D

The ferrite memory arrays are made from pre-formed metal conductors for the ferrite arrays. The conductors are made by forming a thin sheet of a metallizing paste of metal alloy powder, drying the paste layer, bisque firing the dried sheet at a first temperature, and then punching the conductors from the fired sheet. During the bisque firing, the conductor sheet shrinks to 58 percent of its pre-fired volume and the alloy particles sinter

together. The conductors are embedded in ferrite sheet material and finally fired at a second higher temperature during which firing the conductors shrink approximately the same degree as the ferrite material. Official Gazette of the U.S. Patent Office

N75-13033 Illinois Inst. of Tech., Chicago.
STRENGTH AND FRACTURE PROPERTIES OF RANDOM GLASS FIBER COMPOSITES Ph.D. Thesis
Satish Kumar Gaggar 1974 277 p
Avail: Univ. Microfilms Order No. 74-23978

The strength and the fracture behavior of epoxy and polyester composites has been studied and the effect of various material parameters and test variables has been determined. Various linear elastic fracture mechanics (LEFM) test techniques such as single edge notch tests, double edge notch tests, compliance tests and notch bend tests were used in this study. Effects of notch root radius, notch configuration, specimen thickness and notch length on candidate stress intensity factor were evaluated. It was determined that a substantial amount of slow crack growth occurs in these materials prior to unstable crack propagation and hence the concept of crack growth resistance curve (R-curve) should be applied to these composites to characterize their fracture behavior. R-curves for epoxy and polyester composites were developed and used to predict the crack instability points for the materials. Dissert. Abstr.

N75-13034# Advisory Group for Aerospace Research and Development, Paris (France).
AVIONIC RADOME MATERIALS
R. H. Cary, ed. (Roy. Radar Est.) Oct. 1974 243 p refs
(AGARD-AR-75) Avail: NTIS HC $7.50

The electrical, mechanical, and thermal properties of materials are discussed for the wall, core, finish, and coating for radomes. These properties are presented for the following composite materials: polyesters, epoxy resins, polymides, silicone resins, and phenolic resins. F.O.S.

N75-13035*# Martin Marietta Corp., Denver, Colo.
HIGH-PURITY SILICA REFLECTING HEAT SHIELD DEVELOPMENT
William M. Congdon Aug. 1974 121 p refs
(Contract NAS2-7912)
(NASA-CR-137574) Avail: NTIS HC $5.25 CSCL 11D

A high-purity, fused-silica reflecting heat shield for the thermal protection of outer-planet probes was developed. Factors that strongly influence the performance of a silica heat shield were studied. Silica-bonded silica configurations, each prepared by a different technique, were investigated and rated according to its relative merits. Slip-casting was selected as the preferred fabrication method because it produced good reflectivity and good strength, and is relatively easy to scale up for a full-size outer-planet probe. The slips were cast using a variety of different particle sizes: continuous particle-size slips; monodisperse particle-size slips; and blends of monodisperse particle-size slips were studied. In general, smaller particles gave the highest reflectance. The monodisperse slips as well as the blend slips gave a higher reflectance than the continuous particle-size slips. An upgraded and fused natural quartz was used to study the effects of microstructure on reflectance and as the baseline to ascertain the increase in reflectance obtained from using a higher-purity synthetic material. Author

N75-13036*# Scientific Translation Service, Santa Barbara, Calif.
INFLUENCE OF SHRINKAGE STRESSES ON THE STABILITY OF COMPOSITE LAMINATED MATERIALS
A. N. Guz Washington NASA Dec. 1974 12 p refs Transl. into ENGLISH from Tepl. Napryazh. Elementakh Konstruktsii (USSR), no. 10, 1970 p 11-17
(Contract NASw-2483)
(NASA-TT-F-16050) Avail: NTIS HC $3.25 CSCL 11D

The mechanism of stability loss in the microvolume of laminated composites during shrinkage was studied on the basis of three-dimensional linearized stability equations at small subcritical deformations. It was assumed that the layers after having been combined to a monolith at a certain temperature are subjected to cooling. It was shown that instability will always occur in the shortwave mode for composites with small filler concentrations. Author

N75-13037# National Aerospace Lab., Tokyo (Japan).
FLEXURAL FATIGUE STRENGTH OF CARBON FIBER COMPOSITES
Toshiyasu Furuta, Yoshio Noguchi, and Masamichi Matushima 1974 12 p refs In JAPANESE; ENGLISH summary
(NAL-TR-366) Avail: NTIS HC $3.25

The static and dynamic mechanical properties of composite materials with carbon fiber reinforcement were investigated. The test was performed on the composites consisting of matrices of epoxy (EPON 828) and polyimide resin (KERIMID 601), and the reinforcement of high tension type of carbon fibers. The experiment was carried out both at room temperature and at + 120 C. The static flexural strength and Young's modulus as well as the flexural fatigue strength were determined. The results show that the ratio of 10 to the 7th power cycles flexural fatigue strength to the static flexural strength is about 0.6 to 0.67 times. Some important improvements in the fatigue testing machine are discussed. Author

N75-13038# Oak Ridge National Lab., Tenn.
AEROSOL PHYSICS OF ASBESTOS FIBERS: INTERCEPTION
B. R. Fish Jul. 1974 18 p refs
(Contract W-7405-eng-26)
(ORNL-TM-4051) Avail: NTIS HC $3.25

A theoretical analysis of deposition by geometrical interception of elongated fibers is described. Deposition, or penetration, is strongly affected by fiber orientation. No fibers oriented perpendicularly to the flow direction can penetrate a hollow circular cylinder having a diameter (D) smaller than the fiber length (L). In the case of randomly oriented fibers, when L = D the estimated fraction penetrating is nearly 30% and is approximately 27 (D/L)% for L > 3D. For the case of fibers having a cosine distribution of position angle relative to the flow direction, penetration is calculated to be 42.4 (D/L)% for L equal to or greater than D. Author

N75-13039# Texas Univ., Austin. Dept. of Mechanical Engineering.
SIZE AND VOLUME FRACTION EFFECTS ON FRACTURE BEHAVIOR IN COMPOSITE MATERIALS Final Report, 15 Mar. 1971 - 31 May 1974
Thomas H. Courtney Aug. 1974 16 p refs
(Grant DA-ARO(D)-31-124-73-G136)
(AD-786192; AROD-9408-3-MC) Avail: NTIS CSCL 11/4

The results of studies on the fracture behavior of metal matrix composite materials are summarized. These studies were conducted on both eutectic and bundle-and-draw metal matrix composites. In the latter type of composite, two types of fracture mode were observed: in instantaneous fracture, composite failure is concurrent with the failure of the first fiber; in stepwise fracture, additional composite elongation after the first fiber break was necessary to induce composite fracture. The eutectic composite (Al-Al3Ni) studied failed generally by a statistical accumulation of fiber fractures. Analysis of fiber fracture prior to composite failure allowed a more accurate partitioning of stress between fiber and matrix as well as determination of insitu fiber ineffective lengths and distributive in breaking strengths. (Modified author abstract) GRA

N75-13040# Naval Academy, Annapolis, Md.
IMPACT STRENGTH OF FIBROUS COMPOSITE MATERIALS FOR HIGH PERFORMANCE STRUCTURES Final Report, 15 Jun. 1973 - 31 Aug. 1974
George C. Chang 31 Aug. 1974 125 p refs
(AD-786143; EW-7-74) Avail: NTIS CSCL 11/4

Fundamental concepts of, and practices in, impact testing for the evaluation of toughness of engineering materials are discussed, along with the linear elastic fracture mechanics approach. Various impact testing methods, such as Izod, Charpy, DWTT, etc., are analyzed and compared. Also discussed are various aspects of testing for impact by foreign objects. Some relevant properties of advanced fiber-reinforced composite materials, such as glass/epoxy, graphite/epoxy, certain metal-matrix composites, etc., are discussed within the context of material toughness. The state-of-the-art in impact testing of such composites is analyzed, with significant results also summarized. Results of a series of impact testing carried out

in this investigation are discussed. (Modified author abstract) GRA

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N75-13041 Clark Univ., Worcester, Mass.
PROPERTIES OF LONG-WAVELENGTH DISPERSION RELATIONS OF IONIC CRYSTALS Ph.D. Thesis
Carol Loughlin Mainville 1974 136 p
Avail: Univ. Microfilms Order No. 74-24189

Using the methods of group theory, it was proved that those lattices whose point groups belong to the regular system have the property that all of the branches of their dispersion relations do approach definite frequencies as wave vector goes to zero. It was further proved that all noncubic lattices, whose point groups do not belong to the regular system, have some branches of their dispersion relations which do not approach definite frequencies as wave vector goes to zero. Results were obtained for a large category of cubic lattices; for a shell model of a NaCl-type lattice; and for a tetragonal lattice with two particles per unit cell. With these results one could now go on and calculate the long-wave-length contribution to the phonon frequency spectrum due to those branches of the dispersion relations whose zero order degeneracies are split by the presence of the Coulomb forces. Dissert. Abstr.

N75-13042 Saint Louis Univ., Mo.
FREEZING POTENTIALS AND ELECTRICAL CONDUCTIVITIES OF LiF, LiCl, AND AMINE GROUP ICES Ph.D. Thesis
Thomas Stephen 1974 163 p
Avail: Univ. Microfilms Order No. 74-24146

The Workman-Reynolds or freezing voltage was measured during the phase change of dilute aqueous solutions of ammonia (NH3), methylamine(CH3NH2), dimethylamine((CH3)2NH), and trimethylamine ((CH3)3N). The potentials relative to the liquid were ice positive for the ammonia solution (approximately 230V at approximately 0.00002 N) indicating the preferential incorporation of the NH4 ion in the ice structure, and ice negative for all three amine solutions indicating preferential incorporation of OH(-)into the ice structure over the positive methyl-, dimethyl-, or trimethyl-ammonium ion. The initial voltage pulse (largest for methylamine, 8.2V, and least for trimethylamine solution, 2.04V) observed at the beginning of freezing for all three amine solutions is explained in terms of the steric factor and electric dipole moment of these positive ions. Dissert. Abstr.

N75-13043 University of Southern Calif., Los Angeles.
LIGHT SCATTERING STUDIES IN FERROELECTRIC CRYSTALS Ph.D. Thesis
Peter Otto Cervenka 1974 120 p
Avail: Univ. Microfilms Order No. 74-21463

The phenomenon of optically induced refractive index anomalies is reviewed. Saturated time fluctuations in LiNbO3 were fitted to an exponential cosine autocorrelation function for a specific situation. The static effect as a function of temperature was studied. This method yields trap level activation energies of 0.98, 0.22, and 0.36 eV. In order to study the ferroelectric phase transition at 49 C in triglycine sulfate (TGS), the A(y) Raman modes as function of temperature from 72 K to above T sub C were followed. A relaxation mechanism approach was applied to the TGS dielectric data. The temperature variation below and above T sub C of the activation energy, the Mason A factor, and the dielectric constant were obtained. It is concluded that the phonon contribution to the dielectric constant is small (about 10%) below T sub C and becomes important (about 90%) only as the phase transformation is completed. The phase mechanism and the dielectric anomaly have to be attributed to a dipolar mode involving the whole molecule and having a frequency of about 10 to the 7th power Hz. Dissert. Abstr.

N75-13044*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPONTANEOUS IGNITION TEMPERATURE LIMITS OF JET A FUEL IN RESEARCH-COMBUSTOR SEGMENT
Robert D. Ingebo Washington Nov. 1974 13 p refs
(NASA-TM-X-3146; E-8046) Avail: NTIS HC $3.25 CSCL 21B

The effects of inlet-air pressure and reference velocity on the spontaneous-ignition temperature limits of Jet A fuel were determined in a combustor segment with a primary-zone length of 0.076 m (3 in.). At a constant reference velocity of 21.4 m/sec (170 ft/sec), increasing the inlet-air pressure from 21 to 207 N/sq cm decreased the spontaneous-ignition temperature limit from approximately 700 to 555 K. At a constant inlet-air pressure of 41 N/sq cm, increasing the reference velocity from 12j2 to 30.5 m/sec increased the spontaneous-ignition temperature limit from approximately 575 to 800 K. Results are compared with other data in the literature. Author

N75-13045# Materials Research Labs., Maribyrnong (Australia).
RELAXATION RATE OF EXCITED N2 IN N2:CO2 GAS MIXTURES AT ROOM TEMPERATURE AND ATMOSPHERIC PRESSURE
P. J. Beckwith and R. McLeary Sep. 1974 12 p refs
(MRL-TN-351) Avail: NTIS HC $3.25

The relaxation rate of the coupled vibrational energy levels CO2 (001) and N2 (v equals 1) in commercial high-purity CO2:N2 gas mixtures was measured at room temperature and atmospheric pressure by observing the decay in the 4.2 micrometers fluorescence from the 001 level along a flow tube. The value obtained at the limit of zero CO2 concentration (0.0014s(-1) Pa(-1) 140 s(-1) atm(-1)) is not in agreement with the figure of 0.00001 s(-1) Pa(-1) (1 s(-1) atm(-1) derived from extrapolation of previously accepted high temperature results. In the course of the measurements a value of 0.78 s(-1) Pa(-1) (78000 s(-1) atm(-1)) was obtained for the de-excitation rate of CO2 by N2. Author

N75-13046*# LTV Aerospace Corp., Hampton, Va.
THEORETICAL NITRIC OXIDE PRODUCTION INCIDENTAL TO AUTOIGNITION AND COMBUSTION OF SEVERAL FUELS HOMOGENEOUSLY DISPERSED IN AIR UNDER SOME TYPICAL HYPERSONIC FLIGHT CONDITIONS
Gilbert S. Bahn Washington NASA Oct. 1974 219 p refs
(Contract NAS1-10900)
(NASA-CR-2455) Avail: NTIS HC $7.25 CSCL 21B

A reaction package of 100 chemical reactions and attendant reaction rate constants defined for the autoignition and combustion of four carbonaceous fuels, CH4, CH3OH, C2H6, and C2H5OH. Definition of the package was made primarily by means of comparison between trial calculations and experimental data for the autoignition of CH4. Autoignition and combustion of each of these four fuels was calculated under three sets of conditions realistic for hypersonic flight applications, for comparison to hydrogen fuel, particularly with respect to formation of nitric oxide. Results show that, for all of the fuels including hydrogen, if NO production is a significant problem, compromise must be made between approaching equilibrium heat release and approaching equilibrium NO concentration. Author

N75-13047*# Scientific Translation Service, Santa Barbara, Calif.
AMPEROMETRIC TITRATION OF METAL IONS WITH EDTA. THE ANALYTICAL APPLICATION OF THE OXIDE ELECTRODE
Gerald Kainz and Gerhard Sontag Washington NASA Dec. 1974 22 p refs Transl. into ENGLISH from Z. Anal. Chem. (East Germany), v. 269, 1974 p 267-275
(Contract NASw-2483)
(NASA-TT-F-16064) Avail: NTIS HC $3.25 CSCL 07D

In the amperometric titration of metal ions with ethylenediaminetetraacetic acid (EDTA), an oxide electrode is employed (a platinum electrode coated with an oxide layer. These electrodes are active and stable over a relatively wide range of pH and will react to an excess of EDTA (after the equivalence point). The procedures are specified: (1) for determining individual metal

ions, and (2) for determining 2 ions when present together. In case (2) the principle that the stability of metal-EDTA complexes is a function of the pH of the solution is applied. First a pH is chosen such that only one ion forms a stable complex (stability constant greater than 10 to the 7th power). This ion can then be titrated with EDTA without interference from the other ion. Next the pH is adjusted so that the 2nd ion also forms a suitably stable complex. Author

N75-13048*# Kanner (Leo) Associates, Redwood City, Calif.
ELECTROCHEMICAL BEHAVIOR OF CHROMIUM (2) AND CHROMIUM (3) IONS ON A MERCURY DROP ELECTRODE IN SULFATE MEDIA
P. I. Zabotin, Ye. I. Vasilyeva, V. M. Tsokala, and G. Z. Kiryakov Washington NASA Dec. 1974 22 p refs Transl. into ENGLISH from Tr. Inst. Khim. Nauk, Akad. Nauk Kaz. SSR (Alma-Ata), v. 21, 1969 p 52-64
(Contract NASw-2481)
(NASA-TT-F-16122) Avail: NTIS HC $3.25 CSCL 07D

The transport numbers, Cr (II) yields Cr (III) oxidation-reduction reaction exchange currents, and composition and apparent instability constants of the Cr (III) sulfate complexes formed were determined. An unusual temperature dependence of the Cr (II)-Cr (III) ion reduction-oxidation reactions found in dilute solutions, is explained by a change in Cr (III) complex compositions in the solution. Author

N75-13049*# Kanner (Leo) Associates, Redwood City, Calif.
RECENT DEVELOPMENTS IN CHROMATOGRAPHIC EXTRACTION BY MEANS OF SYNTHETIC POLYMERS AND THEIR APPLICATION TO INORGANIC ANALYSIS
C. Pointrenaud Washington NASA Dec. 1974 21 p refs Transl. into ENGLISH from Chim. Anal. (Paris), v. 52, no. 1, Jan. 1970 p 39-47
(Contract NASw-2481)
(NASA-TT-F-16121) Avail: NTIS HC $3.25 CSCL 07B

The application of chromatographic methods to extraction by solvents calls for the choice of carriers able to retain firmly one of the two aqueous or organic phases. For this purpose synthetic polymers may be used which have high mechanical and chemical resistance and which may be obtained in a porous state. An aqueous phase may be quite firmly retained by an ion exchange resin possessing water absorbent groups. As against this, organic solvents may be fixed on inert polymers such as tetrafluoropolyethylene. The equilibria involved may differ greatly depending on the nature of the extracted species. Various possible cases are described and illustrated by examples. Author

N75-13050*# Scientific Translation Service, Santa Barbara, Calif.
A NEW COLOR REACTION FOR CAFFEINE
H. Wachsmuth and L. VanKoeckhoven Washington NASA Dec. 1974 7 p refs Transl. into ENGLISH from J. Pharm. Belg. (Belgium), v. 14, 1959 p 79-81
(Contract NASw-2483)
(NASA-TT-F-16065) Avail: NTIS HC $3.25 CSCL 07C

The caffeine is dissolved in 0.25 ml of freshly prepared solution containing 0.5 ml acetylacetone + 5 ml 2N NaOH, the stoppered tube is maintained at 80 deg for seven minutes, cooled, 0.5 ml of solution containing 100 mg p-dimethylaminobenzaldehyde + 2 ml concentrated HCl is added, the mixture again heated at 80 deg for seven minutes, cooled, 10 ml H2O is added, and the blue-colored solution is read immediately at 615 millimicrons. Quantitative results for caffeine are obtained in mixtures containing theobromine or theophylline. The many compounds which give negative results with this reaction include other puric or pyrimidinic bases and alkaloids. Author

N75-13051# Aeronautical Research Labs., Melbourne (Australia).
CONSTANT VOLUME COMBUSTION OF PROPANE-AIR MIXTURES IN A BOMB
A. Runacres Jun. 1974 15 p refs
(ARL/ME-NOTE-349) Avail: NTIS HC $3.25

A series of propane-air mixtures, ranging from 27% to 116% of stoichiometric, were ignited in a bomb combustor to determine the pressure rises obtainable under true constant volume conditions. The bomb had a volume of 3.4 litres, the dimensions being similar to those of an experimental rig combustor used in the laboratories for research into the feasibility of a constant volume gas turbine. Although combustion times in the bomb were an order longer than those observed under more turbulent conditions in the rig combustor, pressure rises from 63% to 97% of the theoretical were achieved in the bomb. The loss in pressure rise is shown to be entirely due to heat losses during combustion, as the combustion efficiencies in all tests were greater than 99.5%. On the basis of the heat transfer rates observed in the bomb the loss in pressure rise due to heat losses in the rig combustor is estimated to be less than 5%. Heat losses to the combustor walls do not therefore present a major limitation on available pressure rise under rig conditions. Author

N75-13052# Imperial Coll. of Science and Technology, London (England). Mechanical Engineering Dept.
THE CALCULATION OF COMBUSTION PROCESSES. LECTURE 11: SOME DEVELOPMENTS AND VALIDATION WORK ON THE PREDICTION OF TURBULENT UNPREMIXED FLAMES
S. E. Elghobashi, F. C. Lockwood, and A. S. Naguib Feb. 1974 25 p
(HTS-74-8) Avail: NTIS HC $3.25

Circulating and non-circulating flows in turbulent unpremixed flames are examined. Data cover hot and cold flows as well as procedures for predicting and validating flows in unpremixed flames. All work described concerns two-dimensional circumstances only. Author

N75-13053*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PROCESS FOR MAKING ANHYDROUS METAL HALIDES Patent Application
Warren H. Philipp, Stanley J. Marsik, and Charles E. May, inventors (to NASA) Filed 27 Nov. 1974 15 p
(NASA-Case-LEW-11860-1; US-Patent-Appl-SN-527728) Avail: NTIS HC $3.25 CSCL 07D

A process for the preparation and isolation of high purity anhydrous lower valence state metal halides using high energy radiation is reported. The process involves dissolving the corresponding higher valence state metal halide of the desired lower valence state metal halide in an organic liquid, which is selected such that the higher valence state metal halide is soluble and the lower valence state metal halide is insoluble. The solution is subjected to high energy radiation which reduces the higher valence state metal halide to its corresponding lower valence state metal halide, at a temperature in the range of from about 0 C. to about room temperature. NASA

N75-13054*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
GROWTH OF GALLIUM NITRIDE CRYSTALS Patent Application
Ting L. Chu, inventor (to NASA) (Southern Methodist Univ.) Filed 5 Nov. 1974 10 p Sponsored by NASA
(NASA-Case-LAR-11302-1; US-Patent-Appl-SN-521007) Avail: NTIS HC $3.25 CSCL 20B

Bulk gallium nitride single crystals are grown by subjecting in the vapor phase, ammonia and a gallium compound selected from the group consisting of gallium trioxide and gallium monochloride, to a reaction temperature in a reaction vessel. NASA

N75-13055# Council for Scientific and Industrial Research, Pretoria (South Africa).
QUANTITATIVE ANALYSIS OF OXIDE MIXTURES WITH AN ELECTRON MICROPROBE, 3
L. Kusman, R. Derie, and G. Naessens Feb. 1974 10 p refs Transl. into ENGLISH from Silicates Ind. (Belgium) p 211-215 (Rept-1143) Avail: NTIS HC $3.25

The absorption coefficients of oxides of such elements as Pb, W, La, Sn, Fe, Ti, Ca, Si, and Mg were studied in polycrystalline form. The synthesis of the compounds is described, and the calculation methods and experimental results are discussed. F.O.S.

N75-13056# Council for Scientific and Industrial Research, Pretoria (South Africa).

QUANTITATIVE ANALYSIS OF OXIDE MIXTURES WITH AN ELECTRON MICROPROBE
L. Kusman Feb. 1974 10 p refs Transl. into ENGLISH from Silicates Ind. (Belgium) p 13-16
(Rept-1145) Avail: NTIS HC $3.25

The calculation of concentrations using relative intensities is discussed. An iterative method is described for using computers to solve a nonlinear system of equations with several unknowns. F.O.S.

N75-13057# Council for Scientific and Industrial Research, Pretoria (South Africa).
INVESTIGATIONS OF PRIMARY TARS DERIVED FROM THE CARBONISATION OF COAL IN A FLUIDIZED BED
Jose Andre Jan. 1974 28 p refs Transl. into ENGLISH from Brennst.-Chem. (West Germany), v. 48, no. 12, 1967 p 369-377
(Rept-1139) Avail: NTIS HC $3.75

The equipment and procedures for identifying the constituents of the oil fractions and composition of carbonized coal are discussed. The fluidized bed used for the analysis is described. Results of the chemical analysis are summarized to show the proportions of paraffins, olefins, aromatics, acids, and bases. A schematic diagram of the tar treatment is developed. Author

N75-13058# Council for Scientific and Industrial Research, Pretoria (South Africa).
MICROANALYSIS OF SOLIDS BY MASS SPECTROGRAPHY USING AN ION LASER BEAM
J. F. Eloy and R. Stefani Dec. 1973 9 p refs Transl. into ENGLISH from Proc. of the 16th Intern. Spectroscopium Conf. (Florence), Sep. 1973 p 310-315 (French Language Document)
(Rept-1134) Avail: NTIS HC $3.25

A mass spectrograph using a laser source and simple magnetic deflection was developed for chemical microanalysis of solid sample surfaces. The ionization produced by laser impact facilitates the examination of surfaces or thin layers of conductor or insulator materials. Emission of ions lasts for about 20 microns, and the photographic detector with its large aperture covers a large portion of the periodic table. An original post acceleration device makes possible the analysis of elements with a detection limit reaching as high as 50 ppm per laser shot. Laser-target interaction and luminosity of the ion optical system distinguish it from the double focussing system. Author

N75-13059# Council for Scientific and Industrial Research, Pretoria (South Africa).
QUANTITATIVE ANALYSIS OF OXIDE MIXTURES WITH AN ELECTRON MICROPROBE, 2
L. Kusman, R. Derie, and G. Naessens Feb. 1974 14 p refs Transl. into ENGLISH from Silicates Ind. (Belgium) p 65-70
(Rept-1144) Avail: NTIS HC $3.25

Combinations of two or more oxides were synthesized and analyzed. The analyzed elements were Mg, Al, Si, Ca, Fe, Cr, and Ti. The results obtained with various calculation methods were compared. Author

N75-13060# Commissariat a l'Energie Atomique, Saclay (France).
STUDY OF FLUORINE IN THE CONDENSED AND ADSORBED STATES USING SPECTROSCOPIC METHODS Ph.D. Thesis - Lyon Univ.
J. C. Barral May 1974 127 p refs In FRENCH
(CEA-R-4529) Avail: AEC Depository Libraries HC $9.50

A study, using spectroscopic methods, was made of fluorine in the condensed, solid, liquid, and adsorbed states. Detailed descriptions are given of the physical and chemical properties of the gas and its adsorption by porous solids. Data also cover Raman and infrared spectra and the anistropic structure of fluorine. Transl. by E.H.W.

N75-13061# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Reaktorentwicklung.
BEHAVIOR OF SODIUM FIRES AND SUITABLE PROTECTING SYSTEMS
F. Huber, P. Menzenhauer, W. Peppler, and W. Till Apr. 1974 142 p refs In GERMAN
(KFK-1970) Avail: AEC Depository Libraries HC $10.25

The course of sodium fires of different types has been investigated. The studies were directed to sodium area conflagrations and suitable protection systems to confine such fires. Experiments were performed in a closed hall approximately 8 m long x 8 m wide. The area conflagrations were executed in steel pans 0.18 to 4.5 sq cm. Sodium quantities were between 10 to 200 liter at temperatures between 400 and 820 C. Spray fires and fires at isolated pipes were also studied. The temperatures, reaction rates, and the production of aerosols were measured. Tests with extinguishing powder were executed during some fires. The fires were monitored by series of slides and films. Author (NSA)

N75-13062# European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
HYDROGEN PRODUCTION FROM WATER USING NUCLEAR HEAT. Annual Progress Report, period ending Dec. 1972
G. Beghi, ed. 1974 88 p refs
(EUR-5059e; PR-3) Avail: AEC Depository Libraries HC $7.50; EUR B. Fr. 125.-

Multistep chemical processes for the decomposition of water using nuclear heat was studied with the intention of producing hydrogen as an intermediate energy vector. The results of the experimental work performed during the year 1972 are reported; the list of the sixteen cycles which were defined is indicated. The studies were principally related to chemical reactions (equilibria and kinetics studies), to physical property measurements, to the corrosion problems, and to preliminary flow sheet determination. The block diagram calculations for two processes are reported. Author (NSA)

N75-13063# Tennessee Univ., Knoxville.
INVESTIGATION OF THE UTILITY OF KINETICALLY CONTROLLED AND CATALYTIC REACTIONS TO PERFORM ENVIRONMENTAL DETERMINATIONS BY PARALLEL SPECTROPHOTOMETRIC ANALYSIS Ph.D. Thesis
J. L. Bowling Mar. 1974 102 p refs Sponsored by AEC
(TID-26594) Avail: NTIS HC $5.25

The analytical performance of the GeMSAEC spectrophotometric analyzer and the principles of parallel analysis which it employs were evaluated with respect to several important environmental species. The GeMSAEC system used was interfaced with a small computer for data collection and treatment. The production of formaldehyde from the selective cleavage of the double bond of 4-allyl 2-methoxy phenol (eugenol) by ozone permitted the specific determination of ozone in air samples. A rapid ion exchange separation converted the methylene blue spot test for selenium into a selective and sensitive method for quantitative determination of trace selenium. A modified GeMSAEC system was used for chemiluminescence studies. The use of EDTA as a general masking agent permitted the determination of chromium using the transition metal catalyzed reduction of luminol by basic hydrogen peroxide. The ability of the GeMSAEC to perform rapid, accurate, and reproducible analyses was demonstrated. Author (NSA)

N75-13064# Oklahoma State Univ., Stillwater. Dept. of Chemistry.
MASS SPECTROMETRY AS USED TO DETERMINE TRACE ORGANIC CONSTITUENTS IN AQUATIC SYSTEMS
J. M. Pierce Apr. 1974 19 p refs Sponsored by AEC
(ORO-4254-23) Avail: NTIS HC $3.25

A simplified component approach as to how a mass spectrometer functions is presented along with two examples of fragmentation patterns. These patterns are the backbone of structural analysis of organic molecules by mass spectrometry. Finally, several applications of mass spectrometry to the determination of organic constituents of water are reviewed. Author (NSA)

N75-13065# Oklahoma State Univ., Stillwater.
DETERMINATION OF ORGANIC COMPOUNDS IN AQUATIC SYSTEMS BY HIGH PRESSURE LIQUID CHROMATOGRAPHY
J. Caplinger 1974 18 p refs Sponsored by AEC
(ORO-4254-18) Avail: NTIS HC $3.25

It is shown that many different types of organic compounds

exist in water in low concentrations. High pressure liquid chromatography has the ability to meet this wide variety of compounds with a wide variety of stationary and mobile phases. The mobile phase can range from nonpolar to polar or from acidic to basic while the stationary phase can also range from polar to nonpolar or from cationic to anionic. Gradient elution increases the range of liquid chromatography and multi-detection systems enhance the versatility of the high pressure liquid chromatograph. Mass spectrometers can also be directly coupled with a HPLC for direct identification of eluted compounds.
Author

N75-13066# Colorado School of Mines, Golden.
LIQUID LITHIUM CORROSION RESEARCH Progress Report, 1 Apr. 1973 - 31 Dec. 1974
D. L. Olson and W. L. Bradley 1974 25 p refs
(Contract AT(11-1)-2313)
(COO-2313-1) Avail: NTIS HC $3.25

At 800 C, liquid lithium penetration of grain boundaries of a 304L stainless steel occurred to a depth of 0.271 mm in 14 h. Initial weight gains and subsequent weight losses are attributed to liquid lithium penetration at the grain boundaries followed by dissolution of whole grains into the melt. Preliminary grain boundary grooving experiments are now in progress. Experiments on the interaction of stresses and liquid lithium corrosion are now underway. Studies of liquid lithium corrosion of the heterogeneous region surrounding a weld in 304 stainless steel are also being initiated. A feasibility study has suggested that it should be possible to build a liquid lithium forced convection system using a Wilfley pump. An experimental technique is being developed for measuring and controlling the amount of nitrogen impurity in the liquid lithium. NSA

N75-13067# European Atomic Energy Community, Ispra (Italy).
PRESSURE HISTORY DURING FLASHING CAUSED BY A SUDDEN EXPLOSION
G. Friz and W. Riebold May 1974 29 p refs
(EUR-5039) Avail: AEC Depository Libraries HC $4.50

The pressure history in a flashing liquid which follows a volume step is calculated on the basis of the thin thermal layer model considering also the rise of the bubbles formed during the initial volume step. The number N of bubbles per cm3 is introduced as a parameter. The numerical calculations were done for water in the temperature range from 280 to 340 C. N varied from 1.0 to 10,000(1/cu cm). Pressure curves and the half value time t sub h of return to the equilibrium pressure are presented as functions of initial water temperature, bubble number and initial pressure step. Author (NSA)

N75-13068# Oak Ridge National Lab., Tenn.
LOW-PRESSURE OXIDATION OF T-111 AND EFFECT ON TENSILE PROPERTIES
H. Inouye and C. T. Liu Aug. 1974 25 p refs
(Contract W-7405-eng-26)
(ORNL-TM-4621) Avail: NTIS HC $3.25

The kinetics of the oxygen contamination of T-111 by low pressure gases was determined, and the resulting degradation of the tensile properties was measured to allow predictions of the useful life and establish the permissible limit of oxygen in the alloy when used as the capsule for containing (Pu-238)O2. The contamination rate of T-111 with low pressure oxygen, water vapor, and the gases outgassed from graphite and Min-K insulation varied directly with the gas pressure, varied inversely with the alloy thickness, was constant with time, and was relatively insensitive to temperature between 825 and 1200 C. The ductility of T-111 decreased sharply with the oxygen content except at 760 and 825 C; at these temperatures an increase in the strain-hardening rate allowed the ductibility to remain unchanged from the annealed values up to 500 or 750 ppM O. The tolerance of T-111 for oxygen doubled on increasing the contaminating temperature from 825 to 1000 C and increased by an additional order of magnitude at 1200 C. Author (NSA)

N75-13069# Sussex Univ., Brighton (England).
EXPERIMENTS ON THE FORMATION AND SURFACE STATES OF ADSORBED HELIUM FILMS Final Technical Report
D. F. Brewer Jan. 1974 47 p refs
(Contract DAJA37-73-C-2416)
(AD-780167/3) Avail: NTIS HC $3.75 CSCL 07/4

Phases of He3 and He4 adsorbed on a porous substrate at low temperatures are investigated. Information is given on gas surface interactions, the formation and structure of films, the effect of size limitation on the properties of three-dimensional material, free surface states on the film, and mean free path effects. The recent discovery of superfluidity in liquid He3 which is closely allied to superconductivity in metals is described. Results of nuclear magnetic resonance measurements on monolayer He3 are described and discussed in terms of the mode of formation of the films. The design and construction of compressional refrigeration apparatus is described along with apparatus to measure the density of adsorbed helium at the lambda transition in He4 and at the critical points of He3 and He4.
Author (GRA)

N75-13070# California Univ., Berkeley. Fire Research Group.
DIFFUSION CONTROLLED COMBUSTION OF POLYMERS
Donald J. Holve Jun. 1974 159 p refs
(Grant NSF GI-43A1)
(PB-233920/8; UCB-FRG-74-2; ME-74-4) Avail: NTIS HC $6.25 CSCL 21B

A theoretical and experimental study of polymer combustion in an opposed flow diffusion flame is presented. An algebraic formula was derived, expressing the burning rate as a function of the fluid mechanic and thermodynamic variables. A polymer sample feed system was developed which continuously positions the burning polymer surface within plus or minus 0.01 mm of a given set point, allowing accurate regression rate and detailed solid and gas phase flame structure measurements. Regression rate measurements of twelve commercial polymers as a function of oxygen concentration and oxidizer flowrate are reported. Values of the Spalding transfer number, B, are derived and can serve as a useful flammability index for these materials. (Modified author abstract) GRA

N75-13071# Naval Research Lab., Washington, D.C.
SAMPLING AND DETERMINING THE CONCENTRATION OF FILM-FORMING ORGANIC CONSTITUENTS OF THE AIR-WATER INTERFACE Final Report
William D. Garrett and William R. Barger Aug. 1974 16 p refs
(RR1310341)
(AD-785237; NRL-MR-2852) Avail: NTIS CSCL 07/4

A water surface sampler has been developed to collect the organic constituents of the air-water interface. A sheet of hydrophilic Teflon is used to adsorb polar, surface-active material from the water surface. The hydrophilic sheet will adsorb monomolecular films, and with repeated contracts multiple layers of organic constituents of the water surface are deposited. The adsorbed material is recovered for chemical analysis by solvent extraction. A floating cylinder is used for the in situ determination of the concentration of film-forming organic material adsorbed at the air-water interface. (Modified author abstract) GRA

N75-13072# IBM Watson Research Center, Yorktown Heights, N.Y.
EXPERIMENTAL AND THEORETICAL PHYSICS Final Report, 13 May - 31 Dec. 1973
L. Esaki 31 Dec. 1973 6 p refs
(Contract DAHC04-72-C-0025)
(AD-779535/4) Avail: NTIS HC $3.25 CSCL 20/2

Considerable effort is made to bring the present computer-controlled molecular beam epitaxy system to final perfection. Major improvements in effusion ovens, substrate holders, additional liquid nitrogen shrouds, etc., in the epitaxy system are made. GRA

N75-13073# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
KINETICS AND MECHANISM OF THE THERMAL DECOMPOSITION OF HYDRAZINIUM SALTS
Yu. I. Rubtsov 2 Aug. 1974 11 p refs Transl. into ENGLISH of Conf. Paper Gorenie i Vzryv, Materialy Tretego Vsesoyuznogo Simpoziuma po Goreniyu i Vzryvv, Chernogolovka, 5-10 Jul. 1971 p 771-774
(AD-785107; FTD-HT-23-1380-74) Avail: NTIS CSCL 07/2

The results of an investigation of the thermal decomposition of hydrazinium nitrate were presented. To explain the applicability of this mechanism to other hydrazinium salts the authors investigated the kinetics of the thermal decomposition of hydrazinium chloride, iodide, and azide and their mixtures with hydrazine and other additives. The reaction rate was studied with respect to the rate of heat release in a microcalorimeter in sealed glass ampoules having no cold parts. GRA

N75-13074# Amerind Publishing Co. Pvt. Ltd., New Delhi (India).
LECTURES ON CRYSTAL MORPHOLOGY
I. I. Shafranovskii 1973 168 p Transl. into ENGLISH of the book "Lektsii po Kristallomorfologii" Moscow, Vysshaya Shkola Press, 1968 Sponsored by NBS and NSF
(TT-71-58000) Avail: NTIS HC $6.25 CSCL 20B

An extensive study of the forms of crystals is presented. The study makes it possible to describe with mathematical precision, crystal polyhedra as well as complex forms, i.e. skeletal crystals, regular intergrowths, details of structural growth, etc. In addition, the dependence is discussed of the external form of crystals on their internal structure and the formation of deformed figures under the influence of the surroundings. GRA

N75-13075# Ultrasystems, Inc., Irvine, Calif.
KINETIC MECHANISM OF METHANE/AIR COMBUSTION WITH POLLUTANT FORMATION Final Report
C. H. Waldman, R. P. Wilson, Jr., and K. L. Maloney Jun. 1974 101 p refs
(Contract EPA-68-02-0270)
(PB-234149/3) Avail: NTIS HC $5.25 CSCL 21B

The report gives results of the evaluation of a large set of chemical reactions describing methane/air combustion to determine the significant reactions at atmospheric pressure, at temperatures of 1500-2500K, and at equivalence ratios of 0.8-1.25. The reactions were screened. A set of 26 reactions/17 species was derived which can duplicate within 5 percent the predicitions of the 134-reaction/25-species master set. Ten additional pyrolysis reactions are cited for low-temperature and fuel-rich applications. The Zeldovich mechanism is the principal route to NO for stoichiometric combustion, but under lean conditions, a path to NO involving N2O is also active. Prompt NO arising from oxygen-atom overshoot was not predicted for an idealized plug flow ignition case. GRA

N75-13076# North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
ASPECTS OF THEORETICAL PLASTICITY AT FINITE DEFORMATION AND LARGE PRESSURE Interim Report
Kerry S. Havner Jun. 1974 28 p refs
(Grant NSF GK-31313)
(PB-234329/1; NSF-GK-31313-74-3) Avail: NTIS HC $3.75 CSCL 20L

A broad theoretical investigation of plasticity in crystalline solids at finite deformation is presented, with primary attention focused upon single crystals and aggregates at large pressure. Nonlinear elastic and nonlinear plastic constitutive relations for cubic crystals undergoing quasi-static deformation processes are studied. An aggregate model is introduced which enables transition to macroscopic behavior, including a prediction of pressure-dependence of yield surfaces in macrostress space. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N75-13077+ Engineering Sciences Data Unit, London (England).
ENDURANCE OF HIGH STRENGTH STEELS (IN BENDING)
Sep. 1971 16 p Sponsored by Roy. Aeron. Soc.
(ESDU-71027-Amend-A) Copyright. Avail: NTIS HC $7.50

The results of approximately 1100 fatigue tests on plain and notched specimens of a number of types of high strength steels were analyzed to give curves (K sub t)(S sub a)/f sub t against N. The data are grouped according to the type of steel, and all results obtained were for specimens with 1.0 less than or equal to K sub t less than or equal to 3.2 tested either as a rotating cantilever (single or two point loading) or as a rotating beam (four point loading), except those results for the austenitic stainless steel DTD166B which were obtained on specimens tested in reverse bending. Author

N75-13078 Welding Inst., Cambridge (England).
THE METALLURGY AND WELDING OF QT 35 AND HY 80 STEELS
1974 67 p refs Sponsored by Min. of Def.
Copyright. Avail: Issuing Activity

The metallurgy, engineering properties, and welding process problems of QT35 and HY80 steels and their parent materials are discussed. The historical development of the steels is outlined and a general account of shipyard experience is given. Weld metal studies covering manual metal arc and the mechanized welding processes used in submarine production are discussed along with the fatigue of welded joints. The application of newer welding processes to ship construction using high strength steels is considered. Information on electroslag, plasma, and electron beam welding is included. Author

N75-13079 California Univ., Los Angeles.
THE EFFECT OF MICROSTRUCTURE ON THE FRACTURE TOUGHNESS OF LOW-ALLOY STEELS Ph.D. Thesis
Syavash Ensha 1974 199 p
Avail: Univ. Microfilms Order No. 74-24587

The effect of microstructural variables on metallurgical parameters and the effect of microstructure on fracture on fracture toughness are studied. The refinement of ferrite grain size in mild and low-carbon steels increase the microscopic cleavage strength and yield strength. The effective root radius is three times the grain diameter for the grain sizes of the practical range, thus the cleavage fracture toughness does not vary with the ferrite grain size at -196 C. The microscopic cleavage strength and the yield strength increases in plain carbon steels when the carbon content is increased. The cleavage fracture toughness increases with carbon content at -196 C. The microscopic cleavage strength is very high in quenched and tempered 4340 steels and increases with a reduction of the prior austenite grain size. Fracture toughness increases as the prior austenite grain size increases. A theoretical model for the cleavage fracture toughness of low-alloy steels is successfully applied. Low microscopic cleavage strength/yield strength values and low work-hardening rates are required. Lower temperatures and higher strain rates favor these conditions. Dissert. Abstr.

N75-13080 Rensselaer Polytechnic Inst., Troy, N.Y.
AN INVESTIGATION OF THE FILM RUPTURE THEORY OF STRESS CORROSION CRACKING Ph.D. Thesis
Ronald Bruce Diegle 1974 200 p
Avail: Univ. Microfilms Order No. 74-26070

A formalized version of the film rupture concept of stress corrosion cracking (SCC) was studied with a model alloy-corrodent system, namely, iron-caustic. Criteria which must be obeyed by systems that stress corrode by a strain enhanced dissolution mechanism were first developed. It was then ascertained that the model system chosen was indeed a candidate for SCC by such a mechanism. Next the individual parameters critical to the theory were separately measured in model experiments. These critical parameters are: the critical strain required to fracture the crack tip film; the crack advance distance following film rupture and preceding repassivation; the repassivation time; and the kinetics of the strain transient occurring at the crack tip as a result of crack advance. Cracking kinetics predicted from these measurements were ultimately compared with observed and previously reported data, and in this way feasibility of the film rupture theory was assessed. Dissert. Abstr.

N75-13081 Yale Univ., New Haven, Conn.
AN EXPERIMENTAL INVESTIGATION OF YIELD SURFACES, NORMALITY AND INCOMPRESSIBILITY ON PURE ALUMINUM AT ROOM AND ELEVATED TEMPERATURES Ph.D. Thesis
Michael David Ricciuti, III 1974 238 p
Avail: Univ. Microfilms Order No. 74-25767

An experimental investigation at room and elevated temperatures, of polycrystalline pure aluminum tubular specimens,

corroborated earlier findings of yield surface motion. In addition, several new observations were made. The yield surface was seen to increase in size for both reverse axial and shear prestresses. For prestressings, where the specimen remained at the prestress point for an extended period of time, the subsequent yield surfaces went through this prestress point. The plastic strain vectors due to the prestressings, were found to be normal to the appropriate yield surface. The plastic strain rate and initial creep strain vector for each prestressing showed directional coincidence indicating a basic similarity for the plastic and creep strain mechanisms. These creep strains were shown to be nonlinear in character.
Dissert. Abstr.

N75-13082 Case Western Reserve Univ., Cleveland, Ohio.
STRUCTURE OF DISLOCATIONS IN TANTALUM Ph.D. Thesis
Gerhard Welsch 1974 225 p
Avail: Univ. Microfilms Order No. 74-25690

Single crystals of high purity tantalum and of tantalum -- nitrogen alloys containing nitrogen concentrations of 150, 450, 1700, and 15000 at. ppm were deformed in tension at 77 K. The dislocation structure in these specimens was investigated by the use of conventional and weak-beam electron microscopy. Also the effects of annealing at 700 K and at 2300 on the dislocation structure were studied. No evidence of a dislocation core dissociation into stable stacking faults could be found by weak-beam microscopy, regardless of the nitrogen concentration. However, results were obtained indicating tetragonal distortions by the nitrogen interstitials in the tantalum lattice. By comparing the results obtained in the present work with the data of other investigators on the mechanical properties of tantalum and tantalum - nitrogen alloys, conclusions could be drawn on the nature of the interactions between the dislocations and the nitrogen interstitial atoms. Dissert. Abstr.

N75-13083 Case Western Reserve Univ., Cleveland, Ohio.
HYDROGEN EMBRITTLEMENT AND STRESS CORROSION CRACKING BEHAVIOR OF HIGH STRENGTH FCC ALLOYS Ph.D. Thesis
John Gregory Papp 1974 106 p
Avail: Univ. Microfilms Order No. 74-25674

The hydrogen embrittlement/stress corrosion cracking behavior of two high strength FCC alloys, K-Monel 500 and A-286 was examined in several aqueous environments. The K-Monel was found to be susceptible to hydrogen induced brittle delayed failure, characterized by intergranular fracture, during cathodic charging in dilute sulfuric acid. This susceptibility to delayed failure increases with increasing strength level. Stress corrosion cracking was not observed in dilute sulfuric acid due to electrochemical considerations that prohibit pitting and therefore hydrogen pick-up. This Monel alloy was not susceptible to cracking under either cathodic or anodic polarization in saturated LiCl and 3.5% NaCl at slightly elevated temperatures, although hydrogen permeation was observed. Alloy-286 exhibits SCC when exposed to saturated LiCl at 130 C and a critical potential for cracking exists that is slightly cathodic to the rest potential.
Dissert. Abstr.

N75-13084* Rensselaer Polytechnic Inst., Troy, N.Y.
A MASS SPECTROMETRIC SYSTEM FOR ANALYZING THERMAL DESORPTION SPECTRA OF ION-IMPLANTED ARGON AND CESIUM IN TUNGSTEN Ph.D. Thesis
George Marshall Wood, Jr. 1974 235 p
Avail: Univ. Microfilms Order No. 74-26100

A mass spectrometric system for determining the characteristics of materials used in instrumental development and aerospace applications was developed. The desorption spectra of cesium that was ion-implanted into polycrystalline tungsten and the effects on the spectra of bombardment of the tungsten by low energy (70 eV) electrons were investigated. Work function changes were measured by the retarding potential diode method. Flash desorption characteristics were observed and gas-reaction mechanisms of the surface of heated metal filaments were studied. Desorption spectra were measured by linearly increasing the sample temperature at a selected rate, the temperature cycling being generated from a ramp-driven dc power supply, with the mass spectrometer tuned to a mass number of interest. Results of the study indicate an anomolous desorption mechanism following an electron bombardment of the sample surface. The enhanced spectra are a function of the post-bombardment time and energy and are suggestive of an increased concentration of cesium atoms, up to 10 or more angstroms below the surface.
Dissert. Abstr.

N75-13085 Polish Academy of Sciences, Warsaw.
THEORY OF THE CREATION OF VACANT MICROFISSURES IN DEFORMATION OF METALS [TEORIA ZARODKOWANIA WAKANSYJNYCH MIKROSZCZELIN WODKSZTALCONYCH METALACH]
Jerzy Krzeminski 1974 85 p refs In POLISH
(Rept-44/1974) Avail: Issuing Activity

Phenomena occurring in a monocrystal were qualitatively described in an analogy with a vapor-liquid system. Activation energy and its role in the system's saturation were discussed. The thermodynamics and kinetics of the formation of microfissure nuclei in monocrystals were investigated and analyzed. The atomic theory of microfissure nucleation on grain boundaries is also presented.
M.J.S.

N75-13086*# Westinghouse Astronuclear Lab., Pittsburgh, Pa.
PROCESS DEVELOPMENT OF TWO HIGH STRENGTH TANTALUM BASE ALLOYS (ASTAR-1211C AND ASTAR-1511C) Final Report, Jun. 1969 - Feb. 1972
R. L. Ammon Nov. 1974 310 p refs
(Contract NAS3-12971)
(NASA-CR-134606; WANL-M-FR-74-002) Avail: NTIS HC $9.25 CSCL 11F

Two tantalum base alloys, Ta-12W-1.0Re-0.7Hf-0.025C (ASTAR-1211C) and Ta-15W-1.0Re-0.7Hf-0.025C(ASTAR-1511C), were cast as 12.5 cm (5 inch) diameter ingots and processed to swaged rod, sheet, forged plate, and tubing. Swaged rod was evaluated with respect to low temperature ductility, elevated temperature tensile properties, and elevated temperature creep behavior. A standard swaging process and final annealing schedule were determined. Elevated temperature tensile properties, low temperature impact properties, low temperature DBTT behavior, and extended elevated temperature creep properties were determined. A process for producing ASTAR-1211C and ASTAR-1511C sheet were developed. The DBTT properties of GTA and EB weld sheet given post-weld anneal and thermal aging treatments were determined using bend and tensile specimens. High and low temperature mechanical properties of forging ASTAR-1211C and ASTAR-1511C plate were determined as well as elevated temperature creep properties. Attempts to produce ASTAR-1211C tubing were partially successful while attempts to make ASTAR-1511C tubing were completely unsuccessful. Author

N75-13087*# Scientific Translation Service, Santa Barbara, Calif.
IMPROVEMENT OF HIGH TEMPERATURE STRENGTH OF TYPE 304 STAINLESS STEEL BY SMALL ADDITIONS OF TITANIUM AND NIOBIUM
T. Shinoda, K. Kinoshita, and I. Minegishi Washington NASA Dec. 1974 38 p refs Transl. into ENGLISH from Tetsu To Hagane (Rutland, Vt.), v. 54, no. 14, Dec. 1968 p 1472-1486
(Contract NASw-2483)
(NASA-TT-F-16044) Avail: NTIS HC $3.75 CSCL 11F

A study was made of improving the high temperature strength of Type 304 stainless steel by additions of titanium and niobium. It was found that in 304 type steel, these additions made a marked improvement in the high temperature strength. It was also found that the creep rupture strength was higher. Author

N75-13088*# Scientific Translation Service, Santa Barbara, Calif.
EFFECT OF SILICON ON THE INTERGRANULAR CORROSION AND GRAIN-BOUNDARY ENERGY OF AUSTENITIC NICKEL-CHROMIUM STAINLESS STEELS
Agnes Camus, Andre Desestret, Michel Froment, and Pierre Guiraldenq Washington NASA Dec. 1974 8 p refs Transl. into ENGLISH from Acad. des Sci., Compt. Rend. (Paris), v. 264, no. 5, 30 Jan. 1967 p 425-428
(Contract NASw-2483)
(NASA-TT-F-16048) Avail: NTIS HC $3.25 CSCL 11F

Addition of 1% silicon to the austenitic nickel-chromium steels produces a maximum in grain-boundary energy and a corresponding maximum in sensitivity to intergranular corrosion. Quenched

austenitic nickel-chromium stainless steels undergo intergranular corrosion when they are held at high anodic potentials corresponding to the transpassivity region. Addition of silicon to these steels produces a considerable change in the magnitude of this type of corrosion: holding specimens in the transpassivity region by means of a potentiostat and immersion in nitric acid containing hexavalent chromium both show maximum intergranular attack on steels containing around 1% silicon; above 2% silicon the intergranular attack disappears completely. Author

N75-13089*# Scientific Translation Service, Santa Barbara, Calif.
ON THE SOLUBILITY OF NITROGEN IN AUSTENITIC CHROMIUM-NICKEL AND CHROMIUM-NICKEL-MOLYBDENUM STEELS
Hubertus Laddach, Gustav Lennartz, and Guenther Preis Washington NASA Dec. 1974 31 p refs Transl. into ENGLISH from DEW (Deut. Edelstahlwerke) Tech. Ber. (Krefeld) v. 13, A74-14696, Jun. 1973 p 75-84
(Contract NASw-2483)
(NASA-TT-F-16053) Avail: NTIS HC $3.75 CSCL 11F

Solubility of nitrogen and effects of dissolved nitrogen and various precipitated phases were studied in steels containing 18% Cr, 14% Ni and with or without 2.5% Mo. It was found that chromium nitride forming at grain boundaries makes the steel brittle. Author

N75-13090*# Scientific Translation Service, Santa Barbara, Calif.
THE EFFECTS OF CARBIDE STABILIZING ELEMENTS Ti, Nb AND V ON THE HIGH TEMPERATURE STRENGTH AND MICROSTRUCTURAL CHANGE OF 18 PERCENT Cr-10 PERCENT Ni AUSTENITIC STEEL
Ryohei Tanaka, Takayuki Shinoda, Tomoyuki Tshii, Toru Mimino, Kazuhisa Kinoshita, and Isao Minegishi Washington NASA Dec. 1974 38 p refs Transl. into ENGLISH from Tetsu To Hagane (Rutland, Vt.), V. 58, no. 12, Oct. 1972 p 1632-1645
(Contract NASw-2483)
(NASA-TT-F-16042) Avail: NTIS HC $3.75 CSCL 11F

The influences of titanium, niobium and vanadium on the creep rupture strength have been studied using 0.1%C-18%Cr-10%Ni stainless steels. The correlation of the strength to the microstructural change during creep has also been discussed. The highest value of 700 C-10,000 hr rupture strength in a titanium and niobium series was obtained at Ti/C and Nb/C atomic ratios of 0.8 and 0.2-0.4, respectively. On the other hand, in a vanadium series, the creep rupture strength of the steel showed its maximum at V/C atomic ratio of about unity at test temperature of 700 C and 800 C, but at 600 C, the strength increased monotonically with vanadium content up to 1.53%. The high strengths of the steels containing proper amounts of titanium, niobium, or vanadium can mainly be attributed to the fine distribution of M23C6 precipitates which is caused by the acceleration of nucleation due to the foregoing precipitation of an MC type carbide within austenite grains. It was deduced that the solid solution strengthening effect of vanadium contributes also to the remarkable increase in the rupture strength of the vanadium steel at 600 C. Author

N75-13091*# Kanner (Leo) Associates, Redwood City, Calif.
THE EFFECT OF MOLYBDENUM, TUNGSTEN, AND VANADIUM ON THE ANNEAL HARDENING OF COLD WORKED 18Cr-12Ni STAINLESS STEEL
I. Morimoto, T. Suzuki, and M. Hijikata Washington NASA Dec. 1974 14 p refs Transl. into ENGLISH from J. Jap. Inst. Metals (Japan), v. 30, no. 4, 1966 p 346-350
(Contract NASw-2481)
(NASA-TT-F-16047) Avail: NTIS HC $3.25 CSCL 11F

The effect of alloying elements on mechanical properties of cold-worked 18Cr-12Ni stainless steel was examined. The hardness and spring limit of 18Cr-12Ni stainless steel, soft in solution-treated condition, increased with increase of cold reduction. Low-temperature annealing after cold work increased the spring limit. Substitutionally dissolved ferrite-forming elements (molybdenum, tungsten and vanadium) improve mechanical properties of steel, though relatively slightly in cold work and subsequent annealing condition. Addition of molybdenum is most effective, with a spring limit of 100 kg/sq mm after annealing at 500 C after 90% reduction. Other mechanical properties of this steel are also improved by this treatment, a hardness of 500 DPN and tensile strength of 170 kg/sq mm being obtained. Author

N75-13092*# Kanner (Leo) Associates, Redwood City, Calif.
EFFECT OF NITROGEN ON THE ELASTOMECHANICAL PROPERTIES OF AUSTENITIC CHROMIUM-NICKEL STEELS
H. Laddach and P. Schueler Washington NASA Dec. 1974 10 p refs Transl. into ENGLISH from Dew Tech. Ber. (West Germany), v. 13, no. 2, Jun. 1973 p 85-88
(Contract NASw-2481)
(NASA-TT-F-16055) Avail: NTIS HC $3.25 CSCL 11F

In an austenitic steel (20% Ni, 20% Cr), addition of 0.29% nitrogen increases the moduli of elasticity and shear. Damping behavior of the steel containing nitrogen differs in the solution-annealed and age-hardened states. Damping is increased by interstitial nitrogen. Precipitation during brief age hardening at 800 C causes an anomaly in damping at 300 C and a shift in the damping curve above 500 C. Stress-induced diffusion of nitrogen atoms between interstitial sites and the nitride phase precipitates immediately nearby and/or a suppression of grain boundary relaxation due to the coverage of grain boundaries by nitride precipitates is suggested as the cause. Author

N75-13093*# General Electric Co., Evendale, Ohio. Nuclear Systems Programs.
PUMPED LITHIUM LOOP TEST TO EVALUATE ADVANCED REFRACTORY METAL ALLOYS AND SIMULATED NUCLEAR FUEL ELEMENTS
G. P. Brandenburf, E. E. Hoffman, and J. P. Smith Jan. 1974 106 p refs
(Contract NAS3-6474)
(NASA-CR-134527) Avail: NTIS HC $5.25 CSCL 11F

The performance was determined of refractory metal alloys and uranium nitride fuel element specimens in flowing 1900F (1083C) lithium. The results demonstrate the suitability of the selected materials to perform satisfactorily from a chemical compatibility standpoint. Author

N75-13094# California Inst. of Tech., Pasadena. W. M. Keck Lab. of Engineering Materials.
AMORPHOUS SUPERCONDUCTING LANTHANUM-GOLD ALLOYS OBTAINED BY LIQUID QUENCHING AEC Research and Development Report No. 53
W. L. Johnson, S. J. Poon, and P. Duwez Apr. 1974 11 p refs
(Contract AT(04-3)-822)
(CALT-822-61) Avail: NTIS HC $3.25

Results of X-ray diffraction studies, electrical resistivity, and critical magnetic field measurements are reported for amorphous superconducting lanthanum-gold alloys obtained by liquid quenching with T sub c = 3.4K. An extremely short electronic mean free path in these alloys results in an unusually small coherence length and a subsequent high upper critical field. Author (NSA)

N75-13095# Los Alamos Scientific Lab., N.Mex.
REACTION BETWEEN PLUTONIUM AND DEUTERIUM. PART 1: RATE MEASUREMENTS BY PRESSURE CHANGES
D. F. Bowersox May 1974 10 p refs
(Contract W-7405-eng-36)
(LA-5515-MS-Pt-1) Avail: NTIS HC $3.25

The reaction between deuterium gas at pressures less than 500 torr and plutonium coupons at from 25 to 600 C was studied by measuring the change in pressure as the reaction proceeds. Below 250 C, the reaction product of PuD 2.7 spalled to expose fresh metal and the rate of reaction corresponded to the expression dQ/dt = k11 (A) (PD), where Q is the ratio of the gram atoms of deuterium reacted to the initial gram atoms of plutonium, dQ/dt is the change in Q per minute, (A) is the geometrical surface area of the metal coupon, and (PD) is the deuterium pressure. At temperatures between 250 and 300 C, some product adhered to the parent metal, and above 300 C, an adherent coating was formed with a composition equivalent to Pu 2.5 or less. Velocity constants were calculated from the data above 330 C by the expression dQ/dt = k26/Q. After the

adherent coating had formed, rates at these higher temperatures were less than at 100 C. Author (NSA)

N75-13096# Georgia Inst. of Tech., Atlanta.
TEMPERATURE DEPENDENCE OF THE MAGNETIC EXCITATIONS IN IRON AND NICKEL Ph.D. Thesis
J. W. Lynn Apr. 1974 146 p refs Sponsored by AEC
(TID-26597) Avail: NTIS HC $5.75

The coherent magnetic inelastic scattering of neutrons has been used to measure the magnetic excitations in iron and nickel from low temperatures to well above the ferromagnetic transition temperatures. The overall spin wave intensities are reduced at higher temperatures, but the abrupt decrease in the spin wave intensity at high energies, interpreted as the intersection of the spin wave spectrum with the Stoner continuum band of spin-flip excitations, is found to be insensitive to the temperature. Measurements of the linewidths show that the spin waves do broaden considerably as the temperature is raised to T sub C. Above T sub C, they continue to broaden slowly in nickel, while in iron they show no additional broadening. Author

N75-13097# Montana State Univ., Bozeman. Dept. of Mechanical Engineering.
HIGH-TEMPERATURE OXIDATION OF IRIDIUM Annual Progress Report
R. T. Wimber Feb. 1974 18 p refs Sponsored by AEC
(RLO-2228-T-1-7; APR-4) Avail: NTIS HC $3.25

The relationship between observed pyrometer temperatures and true wire temperatures was reinvestigated. The results of a revision of the theoretical correlation of the measured rates of oxidation in naturally convected oxygen are presented. Previously unreported experimental results for oxidation of iridium wires in naturally convected oxygen and also results for oxidation in naturally convected air are tabulated. Initial results from an investigation of forced-convection oxidation in air are presented. Author

N75-13098# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
SORPTION OF TRITIUM BY NICKEL DURING PLASTIC DEFORMATION
J. A. Donovan [1974] 19 p refs Presented at AIME Meeting, Pittsburgh, 19 May 1974
(Contract AT(07-2)-1)
(DP-MS-73-71; Conf-740535-1) Avail: NTIS HC $3.25

The effect of plastic deformation on the amount of tritium absorbed, the surface concentration, and the apparent diffusivity was determined by comparing elastically and plastically deformed sections of nickel tensile tubes that were filled with tritium during deformation. Plastic deformation increased the amount of tritium absorbed by the metal and adsorbed on the surface, but decreased the apparent diffusivity. These observed data for nickel can be explained by the trapping theory developed for iron; where the dislocations created during deformation are postulated to trap the tritium, thereby producing higher values for interior and surface tritium concentrations, and lower values for tritium diffusivity. Author (NSA)

N75-13099# United Kingdom Atomic Energy Authority, Harwell (England).
FORMATION OF CAVITIES IN STEELS EXPOSED TO LIQUID SODIUM
A. M. Stoneham May 1974 21 p refs
(AERE-R-7734) Avail: AEC Depository Libraries HC $4.25; VK 50 p; BIS $2.25

The observations of cavities in steels exposed to liquid sodium are analyzed to identify the mechanism of formation of the observed cavities and the relation to the austenite-ferrite transitions seen at the same time. The cavities appear to result from the leaching of Ni, Cr, and other elements from grain boundaries and other fast-diffusion paths. No significant diffusion within the grains, nor surface-limited steps, appear to be involved in cavity formation. The austenite-ferrite transition also involves grain boundary diffusion, but also requires diffusion within the individual grains. The long-term behavior and the question of possible deleterious effects of the cavities on mechanical properties are discussed. Author (NSA)

N75-13100# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Festkoerperforschung.
MODEL CALCULATION FOR THE ALPHA-ALPHA PRIME PHASE TRANSITION IN METAL-HYDROGEN SYSTEMS
H. Horner and H. Wagner Feb. 1974 52 p refs In GERMAN
(JUL-1045-FF) Avail: AEC Depository Libraries HC $5.75

The alpha-alpha prime (gas-liquid) part of the phase diagram of hydrgen dissolved in metals is calculated and compared with experiments for H in Nb. The underlying lattice model includes a hard core repulsion between protons and elastic interaction mediated by the host metal lattice. The long range part of this interaction is treated in mean field approximation. Low density cluster expansions and Monte Carlo calculations are investigated for the hard core repulsion and the microscopic part of the elastic interaction. Reasonable agreement with experimental data is obtained if the microscopic contribution of the elastic interaction is properly taken into account. Author (NSA)

N75-13101# California Univ., Livermore. Lawrence Livermore Lab.
FRACTURE TOUGHNESS OF THIN BERYLLIUM SHEET Ph.D. Thesis - Mich. Technol. Univ.
G. E. Tardiff, Jr. 28 Feb. 1974 154 p refs
(Contract W-7405-eng-48)
(UCRL-51544) Avail: NTIS HC $6.25

The ambient-temperature fracture toughness of thin beryllium sheet (0.80 mm thick) was measured for a wide variety of metallurgical conditions. Various experiments were also carried out to develop an understanding of the factors that account for and limit the magnitude of the fracture toughness. In order to measure the fracture toughness over the widest possible range in yield-strength and fracture-toughness levels, it was necessary to develop fracture test methods for the large-scale plastic yielding regime. The fracture toughness of the ingot source sheet varied depending on the effect of heat treatment on the microstructure. The low toughnesses were associated with the presence of small subgrains in the microstructure. It was concluded that these small subgrains enabled the bend-plane splitting mechanism to reduce the toughness. Author (NSA)

N75-13102# Commissariat a l'Energie Atomique, Bruyeres-le-Chatel (France).
STUDY OF PHASE TRANSFORMATIONS IN TITANIUM ALLOYS. 2: CONTRIBUTION TO THE STUDY OF ISOTHERMAL TRANSFORMATIONS IN Ti-6% Al-6% V-2% Sn-TITANIUM ALLOY, AFTER QUENCHING FROM ALPHA + BETA
C. Fontalirand, C. Beauvais, J. P. Fidelle, and B. Hocheid May 1974 68 p refs In FRENCH
(CEA-R-4566) Avail: AEC Depository Libraries HC $6.50

After preheating at 850 C four transformations areas were evidenced: between 850 and 750 C, adjustment of the compositions and amounts of alpha, beta, and gamma phases existing at equilibrium above 850 C; between 750 and 650 C same trend but gamma disappears; from Ms = 650 C to 500 C, the breakdown of the alpha prime martensite was superimposed on the previous transformations; below 500 C, alpha prime remains stable; the precipitation of omega phase was evidenced by hardness measurements. A systematic relationship has been established between mechanical properties and the structures obtained after selected isothermal holding times. Author (NSA)

N75-13103# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE EFFECT OF STRAIN ON THE MECHANICAL PROPERTIES OF MAGNESIUM ALLOYS ALLOYED WITH YTTRIUM
Z. A. Sviderskaya and A. A. Oreshkina 15 Apr. 1974 14 p refs Transl. into ENGLISH from the book "Splavy Tsvetnykh Metallov" USSR, 1972 p 161-166
(AD-778531/4; FTD-HT-23-843-74) Avail: NTIS HC $3.25 CSCL 11/6

The favorable effect of yttrium on the properties of magnesium alloys at room and elevated temperatures was establish (1-4). The highest strength level characteristics of these alloys are reached after prolonged artificial aging, carried out immediately after pressure shaping without hardening. The possibility of raising the strength properties of aging magnesium alloys by means of

relatively small strain (5-10%) conducted prior to artificial aging was investigated in detail on alloys alloyed with neodium, aluminum, zinc, etc. A significant hardening effect was achieved. Research on the feasibility of raising the strength characteristics of magnesium-yttrium alloys coupled with plastic deformation and artificial aging is described. GRA

N75-13104# Army Foreign Science and Technology Center, Charlottesville, Va.
CERTAIN PROPERTIES OF PRESSED ALUMINUM EUTECTIC ALLOYS
N. R. Bochvar, M. E. Drits, and L. L. Rokhlin May 1974 15 p refs Transl. into ENGLISH from Fiz. Khim. Obrabotki Mater. (USSR), v. 5, 1972 p 54-59
(AD-785979; FSTC-HT-23-0418-74) Avail: NTIS CSCL 11/6

This work evaluates the possibility of obtaining fibrous structures in aluminum eutectic alloys by pressing. Certain mechanical and physical properties of the pressed alloys are determined. One can produce a fibrous structure in Al--Al3Mg2 alloy by hot pressing and annealing. The best strength properties for room temperature in a hot-pressed state were in such alloys as Al--Al3Mg2, Al--Al2Cu, Al--MgZn2 and Al--Al2CuMg. The coefficient of ultrasonic damping of eutectic aluminum alloys is low and gets worse as a result of annealing. GRA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N75-13105*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CHEMICAL RESEARCH PROJECTS OFFICE FUEL TANK SEALANTS REVIEW
R. W. Rosser and J. A. Parker Dec. 1974 151 p
(NASA-TM-X-62401; A-5820) Avail: NTIS HC $6.25 CSCL 11A

The status of high-temperature fuel tank sealants for military and potentially commercial supersonic aircraft is examined. The interrelationships of NASA's sealants program comprise synthesis and development of new fluoroether elastomers, sealant prediction studies, flight simulation and actual flight testing of best state-of-the-art fluorosilicone sealants. The technical accomplishments of these projects are reviewed. Author

N75-13106# General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.
EVALUATION OF NON-MOCA POLYURETHANE ELASTOMER ENCAPSULANT
K. E. Creed, Jr. 28 May 1974 13 p refs
(Contract AT(29-2)-656)
(GEPP-128) Avail: NTIS HC $3.25

A polyurethane product, EN-7, was tested and evaluated, as to the effects of stoichiometric ratios on its physical properties. Results of tests to determine the physical properties of six new nonMOCA commercial urethane systems are reported. Author (NSA)

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power*, *20 Spacecraft Propulsion and Power*, and *44 Energy Production and Conversion*.

N75-13107*# LTV Aerospace Corp., Dallas, Tex.
CAPACITANCE DISCHARGE SYSTEM FOR IGNITION OF SINGLE BRIDGE APOLLO STANDARD INITIATORS (SBASI) Final Report
R. D. Ward Washington NASA Nov. 1974 116 p refs
(Contract NAS1-10000)
(NASA-CR-2461) Avail: NTIS HC $5.25 CSCL 21B

The design support data developed during the single bridge Apollo standard initiator (SBASI) program are presented. A circuit was designed and bread-board tested to verify operational capabilities of the circuit. Test data, design criteria, weight, and reliability trade-off considerations, and final design recommendations are reported. Author

N75-13108# California Univ., Livermore. Lawrence Livermore Lab.
N-COMPONENT EXPLOSIVE SYSTEMS: FEASIBILITY STUDY
R. Quong 11 Jul. 1974 15 p refs
(Contract W-7405-eng-48)
(UCID-16529) Avail: NTIS HC $3.25

A fuel/oxidizer system, TATB (triamino-trinitrobenzene) and HAP(ss) (a saturated solution of hydroxyl ammonium perchlorate), was used to evaluate the characteristics of a multicomponent explosive system for weapons program applications. Both the fuel and oxidizer are individually nonexplosive (or extremely insensitive to impact), and as such their use in nuclear weapons systems would minimize the danger of unintentional detonation as long as the components remain separated. A viable explosive is produced only when the components are combined. Techniques used in preparing the explosive and tests conducted to evaluate explosive performance are discussed. The TATB/HAP(ss) system, although considerably deficient in energy, lends itself to much of the developmental aspects of the study due to the relatively innocuous nature of the individual components. Based on some of the work described in this paper, the concept of using a fuel/oxdizer system appears feasible. Energy output is low, but uniform. Higher-energy systems will need to be developed. There is evidence that such systems can be achieved by using oxidizers with greater oxygen density. Author (NSA)

N75-13109# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
STUDIES OF SLURRY FUELED PROPULSION SYSTEMS Final Progress Report, Sep. 1970 - Jan. 1973
Harry M. Carbone and Bruce A. Reese Jan. 1974 133 p refs
(Contract N00014-67-A-0226-0013)
(AD-779895/2; TM-74-4) Avail: NTIS HC $5.75 CSCL 21/4

The study was conducted to test performances of various specific fuels, both high energy hydrocarbon and slurry fuels, in a sudden dump ramjet combustor and determine the effects of design variables of the combustor on fuel performance. In particular, the combustion efficiencies (determined from measured thrust rises) of specific fuels in the various sudden dump ramjet combustor are presented as function of equivalence ratio. The facility used in the data acquisition process is described. The results of the various fuels and the effects of the design variables of the combustor are then presented and discussed. Flame visualization and flow visualization are also studied. (Modified author abstract) GRA

N75-13110# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EXPERIMENTAL STUDY OF THE CONDENSED PHASE IN THE COMBUSTION PRODUCTS OF METALLIZED SOLID PROPELLANTS
P. Kuentzmann 11 Sep. 1974 33 p refs Transl. into ENGLISH from Rech. Aerosp. (Chatillon-sous-Bagneux), no. 2, Mar./Apr. 1973 p 71-80
(AD-785996; FTD-HC-23-2714-74) Avail: NTIS CSCL 21/2

After recalling the formation processes and the evolution of metallic oxide particles in combustion products of a metallized propellant, the various techniques for experimentally determining their granulometry are presented. It is endeavored to present the characteristics and their limits. The study of experimental results emphasizes the great dispersions which do not permit the definition of the influence of the engine functioning parameters on granulometry other than in a qualitative manner. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N75-13111* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EVACUATED, DISPLACEMENT COMPRESSION MOLD Patent
Wilbur C. Heier, inventor (to NASA) -Issued 26 Nov. 1974 9 p Filed 13 Jul. 1973 Supersedes N73-31444 (11 - 22, p 2677) Continuation-in-part of US Patent Appl. SN-197689, filed 11 Nov. 1971
(NASA-Case-LAR-10782-2; US-Patent-3,850,567; US-Patent-Appl-SN-379049; US-Patent-Class-425-405R; US-Patent-Class-425-438; US-Patent-Class-425-468; US-Patent-Class-249-59; US-Patent-Class-249-144; US-Patent-Class-249-145; US-Patent-Class-425-DIG.43; US-Patent-Appl-SN-197689) Avail: US Patent Office CSCL 13I

A process of molding long thin-wall tubular bodies from thermosetting plastic molding compounds is described wherein the tubular body lengths may be several times the diameters. The process is accomplished by loading a predetermined quantity of molding compound into a female mold cavity closed at one end by a force mandrel. After closing the other end of the female mold with a balance mandrel, the loaded cavity is evacuated by applying a vacuum of from one-to-five mm pressure for a period of fifteen-to-thirty minutes. The mold temperature is raised to the minimum temperature at which the resin constituent of the compound will soften or plasticize and a pressure of 2500 psi is applied. Official Gazette of the U.S. Patent Office

N75-13112# Commissariat a l'Energie Atomique, Grenoble (France).
STORAGE AND UTILIZATION OF LIQUID HYDROGEN ON BOARD THE PEGASE
G. Bertrand, P. Perroud, and J. Rebiere Oct. 1973 20 p refs In FRENCH Presented at AERALL Colloq., Paris, 12 Nov. 1973
(CEA-CONF-2562; Conf-731138-2) Avail: AEC Depository Libraries HC $4.00

Results of a study of a cryogenic tank on board the Pegase platform are presented. A volume of 860 cu m of liquid hydrogen necessary for the duration of a year's mission, is contained in one or three spherical reservoirs. The thermal insulation is obtained by superinsulators in a vacuum container, and the daily losses are 0.7%. The internal sphere, a light alloy (AZ56) or containing titanium, has a minimum weight of approximately 5 tons. The use of honey-combed material allows significant weight gain for the external sphere. The total weight of the reservoir is about 15 tons (structure index 0.25). Interest in the recondensation of hydrogen vapors and the utilization of mixed liquids-solids (slush) is evaluated. The vaporization and reheating of hydrogen are done in a freon exchanger permitting the energy recovery necessary for cooling the compressed air for the combustion cells. Author (NSA)

N75-13113# United Kingdom Atomic Energy Authority, Risley (England).
CONFORM: A NEW CONCEPT FOR THE CONTINUOUS EXTRUSION FORMING OF METALS
C. Etherington Apr. 1974 19 p refs
(TRG-Rept-2530) Avail: AEC Depository Libraries HC $4.00

A new continuous extrusion forming process for metals is described, which is particularly applicable in the wire, section and tube manufacturing fields. The principle of the process is based on the mechanical friction which exists between a billet and its container in conventional extrusion. If the container is rectangular in cross section and three sides are formed as a groove in a rotating wheel, with the fourth side forming a stationary shoe fitting against the outside of the wheel, then rotation of the wheel will carry the billet along with it. If a stop with die orifice is sized to fit the groove and is fixed to the shoe, then as the billet is forced against the die, extrusion can occur. The development of the process from a laboratory bench top model for lead wire, to a powered experimental machine capable of continuously extruding aluminum wire through ratios of 40:1 outlined. Author

N75-13114# Lehigh Univ., Bethlehem, Pa. Inst. for Metal Forming.
HYDROSTATIC EXTRUSION OF ALUMINUM CLAD SUPERCONDUCTOR WIRE Final Report
J. M. Story 3 Jun. 1974 70 p refs
(Contract AT(11-1)-3311)
(COO-3311-13) Avail: NTIS HC $4.25

Acceptable combinations of process variables were studied for the production of a Nb-Ti superconducting alloy in a pure aluminum matrix by hydrostatic extrusion. Conditions for sound flow and defective flow are shown on plots of % reduction in area versus die semi-cone angle. The variables affecting the observed flow mode in hydrostatic extrusion of bimetal rod are reduction in area, die semi-cone angle, core to matrix strength ratio, core to matrix diameter ratio, bond strength between the core and the matrix, friction between the billet and the die, and receiver chamber pressure. In all cases there was a light mechanical bond between the two materials produced by interference fitting the cores into drilled holes. Results showed that increasing the receiver pressure increases the range of acceptable process variables to produce sound flow. Author (NSA)

N75-13115# Northeastern Univ., Boston, Mass.
BULK STRIP PRODUCTION OF AN AMORPHOUS Cu-Zr ALLOY BY PLASMA ARC SPRAYING
B. C. Giessen, N. M. Madhava, R. J. Murphy, R. Ray, and J. Surrette Aug. 1974 15 p refs
(Contract N00014-68-A-0207-0006; NR Proj. 031-758)
(AD-785910; N14-68-A-207-6-1) Avail: NTIS CSCL 13/8

The background and design of a plasma spray unit with a rotary copper substrate and contained in an inert gas chamber is described. This unit is capable of producing amorphous alloys as strip of = 30 mil thickness in bulk quantities at rates of 15 g/min, as demonstrated by the retention of amorphous Cu.60Zr.40. Author (GRA)

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

N75-13116 Ohio State Univ., Columbus.
THE EFFECTS OF PSEUDO-RANDOM NOISE UPON RADAR SYSTEM PERFORMANCE Ph.D. Thesis
David William Berrie 1974 356 p
Avail: Univ. Microfilms Order No. 74-24298

The study was composed of a theoretical investigative and design effort followed by an experimental program to verify the theoretical predictions. The initial task was an investigation of the known theory and applications of pseudo-random noise with particular emphasis upon pseudo-random noise waveforms derived from maximum-length sequences as generated by linear feedback digital shift registers. The results of the investigation were then used in an effectiveness study which related the parameters of a pseudo-random noise generator to the performance of a generic search radar. The effectiveness study showed that increased degradation of receiver performance would occur if the enhancement effect of the pulse integrator on the signal-to-noise ratio in the radar receiver could be reduced. Dissert. Abstr.

N75-13117 Mississippi State Univ., State College.
COMPARISON OF AM AND FM MODULATION TECHNIQUES WITH WALSH EQUIVALENTS Ph.D. Thesis
Jimmy Donald Akers 1974 90 p
Avail: Univ. Microfilms Order No. 74-24214

The results of AM and FM modulation generated by using Walsh waves for the carrier, the modulating waveform. Both the carrier and the modulating waveforms were investigated. Various techniques for finding the Fourier transform of Walsh

functions were presented as well as the techniques for obtaining the Fourier series for the FM waves. A comparison of the parameters describing such communications waves was made with the AM and FM waveforms generated by using sinusoids. Case equations were developed to form the basis for the comparison. The parameters that were considered are power spectrum, bandwidth, signal-to-noise ratio, and transmitter efficiency. Dissert. Abstr.

N75-13118 University of Southern Calif., Los Angeles.
ANALYSIS OF PHASE-LOCKED LOOP IN THE PRESENCE OF TIME VARYING COMMUNICATION CHANNELS Ph.D. Thesis
William Joseph Weber, III 1974 164 p
Avail: Univ. Microfilms Order No. 74-26055

An analysis was made of the performance of the phase locked loop, the heart of a coherent communication system, as the first step in evaluating total performance over time varying channels. The amplitude and phase processes of the three channel models of interest are functions of Gaussian random processes. The total loop phase error process can be characterized in terms of a nonlinear, stochastic, integro-differential equation. The steady state probability density function of the reduced phase error process is derived in general using generalized Fokker-Planck techniques. The solution is in terms of a number of conditional expectations which must be approximated. A case study is set up to approximate these expectations according to: (1) the channel model, (2) the relative bandwidths of the fading processes and the phase error process, and (3) the power ratio of the specular component and the fading components. Dissert. Abstr.

N75-13119 Nauka Press, Moscow (USSR).
FUNDAMENTALS OF THE THEORY OF THE RADIO RECEPTION OF DISCRETE SIGNALS
L. I. Filippov 1974 192 p refs In RUSSIAN
Copyright. Avail: Issuing Activity

The theory of optimal radio reception of discrete signals which have passed through channels with randomly changing parameters during interference is discussed. Arbitrary narrowband and broadband signals are considered. Mathematical models and methods of describing signal-transmitting channels are investigated. The synthesis and analysis of optimal radio receivers are presented. Transl. by M.J.S.

N75-13120# Computer Sciences Corp., Falls Church, Va.
AN INITIAL CONCEPT FOR THE FAA INTEGRATED COMMUNICATIONS SYSTEM Final Report, Mar. - Dec. 1973
J. C. Hansen Dec. 1973 78 p
(Contract DOT-FA72WA-3072)
(AD-778816; FAA-RD-73-132; Rept-4186-3) Avail: NTIS HC $4.00

A concept for an integrated communications system in support of the National Airspace System Operations in the Upgraded Third Generation time period is described. Some of the information features of the system are: (1) flight movement information, (2) flight plan information, (3) air traffic management information, (4) network operations, and (5) technical control operations. The rationale for concept development is explained. Author

N75-13121# Joint Publications Research Service, Arlington, Va.
AUTOMATION, TELEMECHANICS AND COMMUNICATIONS
12 Nov. 1974 39 p Transl. into ENGLISH from Avtomat. Telemekh. Svyaz (Moscow), 1973
(JPRS-63429) Avail: NTIS HC $3.75

Articles are presented on data transmission apparatus, controlled electric clocks, electric clock stations and switchboards, TBS2 transformers, computer languages, radio stations and telephone exchanges. For individual titles, see N75-13122 through N75-13123.

N75-13122 Joint Publications Research Service, Arlington, Va.
DATA TRANSMISSION APPARATUS
V. I. Denisov and V. A. Pavlov *In its* Automation, Telemech. and Commun. (JPRS-63429) 12 Nov. 1974 p 1-9 Transl. into ENGLISH from Avtomat. Telemekh. Svyaz (Moscow), no. 1, 1973 p 7-10 (For availability see N75-13121 04-32)

Industry has organized series production of data transmission apparatus with automatic devices for raising the data authenticity. Two types of such apparatus are considered: the low speed Akkord-50PP and the medium speed Akkord-1200PP. The Akkord-50PP is designed to operate in a network of switched telegraph channels with a speed of 50 baud. The Akkord-1200PP data apparatus for transmitting data over two or four wire telephone channels of standard width on overhead, cable, or radio relay lines is further assessed. J.A.M.

N75-13123 Joint Publications Research Service, Arlington, Va.
SINGLE COMPUTER LANGUAGE IN CEMA COUNTRIES
c61
L. Lazarenko *In its* Automation, Telemech. and Commun. (JPRS-63429) 12 Nov. 1974 p 21-25 Transl. into ENGLISH from Avtomat. Telemekh. Svyaz (Moscow), no. 8, 1973 p 40-42 (For availability see N75-13121 04-32)

Six socialist countries combined to create the Consolidated Computer System (YeS EVM). This system combines seven third-generation computers. The YeS-1050 computer was found to be the most industrious and useful one. The advantages of this system, graphic displays, design aids, and memory storage are also examined. J.A.M.

N75-13124*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
FINE FREQUENCY MEASUREMENT BY COINCIDENCE DETECTION Patent Application
Edward Nossen (RCA) and Eugene Richard Starner, inventors (to NASA) (RCA) Filed 13 Sep. 1974 10 p
(Contract NAS9-13517)
(NASA-Case-MSC-14649-1; US-Patent-Appl-SN-505819) Avail: NTIS HC $3.25 CSCL 17B

A method of measuring a desired frequency by comparing it with a standard frequency is reported. The zero crossings of both frequencies are detected. A command pulse is generated at each coincidence and is used to start and stop a pair of frequency counters adapted to count the desired and standard frequencies. A measure of the desired frequency is obtained by multiplying the known standard frequency by the ratio between the desired count and the standard count obtained in the two frequency counters. NASA

N75-13125*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
TURNSTILE AND FLARED CONE UHF ANTENNA Patent Application
Donald J. Bottoms (Martin Marietta Corp.) and Theofanis G. Gavrillis, inventors (to NASA) (Martin Marietta Corp.) Filed 27 Nov. 1974 10 p
(Contract NAS1-9000)
(NASA-Case-LAR-10970-1; US-Patent-Appl-SN-527790) Avail: NTIS HC $3.25 CSCL 17B

An apparatus is described for improving the broad beamwidth characteristics of a turnstile-cup antenna by the use of a truncated cone to replace the conventional cup and by tilting the turnstile arms back toward the base of the cone. The basic invention consists of a truncated cone with slots, turnstile antenna with feed support, and antenna arms tilted back toward the cone base. Directly below and in alinement with each antenna arm is a slot cut into the cone sides, which aids the broad beamwidth characteristics by the parasitic coupling between the antenna arms and the slots. This antenna yields considerably greater beamwidth than the more conventional antennas. Such increased beamwidth gives the antenna, which was used in the Viking altimeter system, relative independence from changes in antenna orientation. NASA

N75-13126*# Stanford Univ., Calif. Inst. for Plasma Research.
LONG DELAYED RADIO ECHOES
D. M. Sears Nov. 1974 245 p refs
(Grant NGL-05-020-176; Contract N00014-67-A-0112-0044; Grant NSF GA-28819)
(NASA-CR-141112; SU-IPR-584) Avail: NTIS HC $7.50 CSCL 17B

An experimental program involved transmitting a radio signal,

and tape-recording the output of a receiver gang-tuned with the transmitter for the following 30 s interval. The tapes were later audited for possible long delayed echoes (LDE). Although none of the possible LDE received reproduces exactly the transmitted signal, many exhibit features that seem unlikely to have been generated except by an LDE mechanism. A mechanism for producing LDE has been studied which involves signal propagation in an electron plasma wave mode at very low group velocity. A weak beam-plasma instability, due to the presence of electrons precipitating into the ionosphere, is postulated as a means of offsetting collisional and collisionless attenuation of the plasma wave. Local inhomogeneities in the ionosphere cause coupling from the transmitted transverse wave to the plasma wave, and from the plasma wave to a transverse wave which can propagate back to the earth. Delays of the order of one second are estimated for plausible ionospheric parameters. Modifications to the simplified theory leading to prediction of longer delays are discussed. Author

N75-13127# Florida Technological Univ., Orlando.
INTERMODULATION ANALYSIS OF CLASS C TRANSISTORIZED AMPLIFIERS WITH APPLICATIONS TO VHF AMPLIFIERS Final Report
Ed R. McCarter and Robert H. Wollam Sep. 1974 74 p refs
(Contract DOT-FA74WAI-409)
(AD-787608; FAA-RD-74-156) Avail: NTIS HC $4.25

This intermodulation distortion analysis involves transistorized class C amplifiers considered for use in the transmitter output stage of FAA established ground-to-aircraft transmission links. The type of intermodulation problem discussed occurs when one frequency is introduced at the input of a transmitter amplifier and a second frequency is introduced through the output of the amplifier. Since a class C transistorized amplifier is somewhat nonlinear, the two frequencies interact to produce a third intermodulation frequency which shows up in the output but are usually insignificant when compared with the amplitude.
Author

N75-13128# Texas Instruments, Inc., Dallas.
PULSE COMPRESSION RADAR STUDY Final Report, 8 Jun. 1971 - 15 Nov. 1973
Lawrence H. Ragan Mar. 1974 102 p refs
(Contract DOT-FA69WA-2107)
(AD-787233; FAA-RD-73-192) Avail: NTIS HC $5.25

A study was conducted to determine the effects of radar pulse compression on the elimination of ground clutter. The categories of clutter involved are: (1) specific clutter from a single, isolated, point target such as a lone bulding or structure, (2) general clutter from a collection of targets specific in nature but not isolated, such as returns from terrain and vegetation, and (3) distributed clutter caused by atmospheric precipitation. The configuration of the system and the operation of the components are described. Diagrams of the compressed radar pulses are provided. Specifications for a production pulse compression radar are analyzed. Photographs of the plan position indicators are included to show the effect of pulse compression on clutter elimination. Author

N75-13129*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE DEEP SPACE NETWORK Progress Report, Jan. - Feb. 1974
8 Jan. 1975 201 p refs
(Contract NAS7-100)
(NASA-CR-140879; JPL-PR-42-20) Avail: NTIS HC $7.25 CSCL 17B

Deep Space Network (DSN) progress in flight project support, TDA research and technology, network engineering hardware and software implementation, and operations are presented. Articles are included in the following categories: (1) planetary flight projects; (2) tracking and ground-based navigation; (3) spacecraft and ground communications; (4) station control and operations technology; (5) network control and data processing; (6) deep space stations; and (7) network operations. The objectives, functions, and organization of the DSN are summarized. The Deep Space Instrumentation Facility, the Ground Communication Facility, and the Network Control System are described.
Author

N75-13130# Institute for Telecommunication Sciences, Boulder, Colo.
OBJECTIVE MEASUREMENT TECHNIQUES FOR EVALUATING VOICE COMMUNICATION CHANNELS Final Report
R. W. Hubbard and W. J. Hartman Jul. 1974 68 p refs
(Contract DOT-FA72WAI-326)
(AD-786667; FAA-RD-74-77) Avail: NTIS HC $4.25

Methods for objectively evaluating the quality of voice communication circuits, based upon the Articulation Index (AI) are presented. The Speech Communication Index Meter (SCIM) and associated computer programs for calculating AI are discussed and procedures are presented for making system measurements. Author

N75-13131# National Aviation Facilities Experimental Center, Atlantic City, N.J.
TEST REPORT: RADIOFREQUENCY INTERFERENCE/ELECTROMAGNETIC INTERFERENCE MEASUREMENTS NEW YORK AIR ROUTE TRAFFIC CONTROL CENTER Final Report, 9-27 Jul. 1973
Margaretta V. Stone Aug. 1974 184 p Prepared by AEL Serv. Corp., Farmingdale, N. J.
(Contract DOT-FA72NA-728)
(AD-784340; FAA-NA-74-156; FAA-RD-74-110) Avail: NTIS HC $5.75 CSCL 17/7

Electromagnetic interference tests were conducted at an air traffic control center. The tests included measurement of radiated and conducted emission from both the automated system and nonautomated equipments, and radiated and conducted susceptibility of the automated systems. The results of the investigation are summarized. It was concluded that the automated system equipment would not adversely affect the performance of other equipment used in its vicinity, provided that the other equipment met the susceptibility requirements. Author

N75-13132# Raytheon Co., Wayland, Mass. Equipment Div.
ARSR-2 RADAR DUAL FEEDHORN ANTENNA MODIFICATION Final Report, Jun. 1969 - Aug. 1972
Paul E. Rawlinson Dec. 1973 122 p refs
(Contract DOT-FA69WA-2129)
(AD-780047; FAA-RD-73-28) Avail: NTIS HC $4.50

The feasibility of a dual feedhorn configuration employed with the ARSR-2 antenna reflector was investigated. The feedhorn geometry was modified by adding a separate receive only feedhorn and polarizer to produce separate antenna two-way coverage patterns for the close-in and long range capabilities of the radar system. The close-in coverage was obtained by transmission on the normal (low) beam and reception on the second (high or tilted-up) beam. The long range coverage was obtained by both transmission and reception on the normal beam. The results and conclusions indicate that the receive-only pattern had an acceptable sidelobe level, azimuth beamwidth, elevation beam shape, and integrated cancellation ratio; the normal ARSR-2 antenna pattern suffered minimal degradation in both linear and circular polarization; and that a field modification of this system is feasible. Author

N75-13133# Army Foreign Science and Technology Center, Charlottesville, Va.
MEASUREMENT OF COLORED AREAS ON AN OBSERVED OBJECT
N. I. Dushkevich Mar. 1974 7 p refs Transl. into ENGLISH from Tekhn. Kino i Televideniya (USSR), no. 8, 1971 p 64-65
(AD-784273; FSTC-HT-23-1332-73) Avail: NTIS CSCL 14/2

The paper presents a discussion on the possibility of use of television methods for measuring an observed object. The circuitry of the system is described in detail. Although other systems are available, the one described is simpler and more reliable.
GRA

N75-13134# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
A STUDY TO DETERMINE THE FEASIBILITY OF USING REMOTE SENSING TECHNIQUES TO PREVENT SHIP COLLISIONS WITH SELECTED DRAW/LIFT BRIDGES Final Report
E. F. Greneker, T. M. Miller, and J. L. Eaves May 1974 78 p Sponsored in part by Georgia Dept. of Transportation, Atlanta

(PB-233211/2) Avail: NTIS HC $4.75 CSCL 17I

The collision of an ocean going freighter with the Sidney Lanier Bridge in 1972, and subsequent collisions between ships and bridges spanning the State's navigable waterways led the Georgia Department of Transportation to fund this study to determine if an electronic sensor can be developed to warn of an impending collision between a ship and a bridge before impact. It was concluded that a radar warning system could be designed and built that would diminish the possibility of future collisions with the Sidney Lanier Bridge, Brunswick, Georgia. A radar sensor, computerized signal processor, ship's pilot display and bridgetender's display system for the purpose of collision avoidance is detailed in this report. (Modified author abstract) GRA

N75-13135# Naval Research Lab., Washington, D.C.
SOLITARY OCCUPANCY FOR UNEQUAL CELL PROBABILITIES WITH APPLICATION TO DOPPLER RADARS FOR OCEAN SURVEILLANCE Interim Report
Harold L. Stalford 20 May 1974 25 p refs
(AD-780692/0; NRL-7708) Avail: NTIS HC $3.25 CSCL 17/9

An occupancy problem in combinatorial theory is investigated whose solution has application in ocean surveillance. In particular, theory is developed for calculating the probability of solitary occupancy of N objects in M cells of unequal cell probabilities. For t = 2, 3,...,N the sum of the cell probabilities when all are raised to the t th power is defined as a new variable. These N-1 new variables are shown to be sufficient as arguments in representing the above probability as a polynomial equation. As an application, the theory is used to calculate the capability of a Doppler radar to resolve N ship Dopplers contained in the same range and azimuth cell. Author (GRA)

N75-13136# Hughes Research Labs., Malibu, Calif.
COHERENT OPTICAL ADAPTIVE TECHNIQUES (COAT) Technical Report, 27 Dec. 1973 - 26 Mar. 1974
W. B. Bridges, L. S. Horwitz, R. M. Kubo, J. L. Pearson, and T. J. Walsh Apr. 1974 64 p refs
(Contract F30602-73-C-0248; ARPA Order 1279)
(AD-783281; RADC-TR-74-187) Avail: NTIS CSCL 17/8

Coherent optical adaptive techniques are designed to overcome degradations experienced by optical beams propagating in media with fixed or time-varying distortions. This report presents results from the calibration phase of an experimental eighteen-element, self-adaptive optical phased array. Initial tests on a turbulent, outdoor propagation range are also presented. Computer simulation studies have demonstrated the advantages of a divider-AGC network and have detailed the theoretical system performance with glints of varying reflectivities, with various signal-to-noise ratios, and with different receiver aperture diameters. Phase shifter hysteresis was found to have a negligible effect on system performance. Laboratory calibration measurements both with and without artificial turbulence show that the experimental COAT system performs very close to theoretical predictions. (Modified author abstract) GRA

N75-13137# Braddock, Dunn and McDonald, Inc., Albuquerque, N.Mex.
RADIATION FIELD COMPRESSION BY DISPERSIVE BROADBAND ANTENNAS Final Technical Report, 17 Jan. - 17 Nov. 1973
C. M. Wiggins and J. S. Yu May 1974 388 p refs
(Contract F30602-73-C-0110)
(AD-783278; BDM/A-186-73-TR; RADC-TR-74-104) Avail: NTIS CSCL 09/5

The technique employs an antenna as a waveform compression device. A coded waveform from the transmitter will be spatially compressed during radiation. The primary consideration of this report is to determine the limitations of time-bandwidth products versus bandwidth both from a theoretical and practical viewpoint. It is shown that present-day antennas have time-bandwidth products exceeding 2000. It is shown that the electromagnetic fields can be increased over conventional spatial antenna concepts. Author (GRA)

N75-13138# Lexington Labs., Inc., Cambridge, Mass.
THE ALTAIR TRACKING ALGORITHMS
H. B. Brooks 18 Jun. 1974 57 p refs
(Contract F19628-73-C-0002; DA Proj. 9X2-65301-D-614)
(AD-783285; TN-1974-30; ESD-TR-74-219) Avail: NTIS CSCL 17/9

Operation of the ALTAIR tracking loops is described in narrative form. The Kalman-Bucy type algorithms are reinterpreted in meaningful physical quantities (radar measurement error and assumed target acceleration). Smoothing time (bandwidth) and damping are derived directly in those physical terms. Author (GRA)

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N75-13139* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PHASE-LOCKED SERVO SYSTEM Patent
Clifford Burdin, inventor (to NASA) (McDonnell-Douglas Corp., Huntington Beach, Calif.) Issued 26 Nov. 1974 8 p Filed 26 Oct. 1973 Supersedes N74-11058 (12 - 02, p 0140) Sponsored by NASA
(NASA-Case-MFS-22073-1; US-Patent-3,851,238; US-Patent-Appl-SN-409991; US-Patent-Class-318-649; US-Patent-Class-318-608; US-Patent-Class-318-640; US-Patent-Class-318-675) Avail: US Patent Office CSCL 09A

A phase lock servo system is described for synchronizing the rotation of a slip ring assembly with the rotation of an air bearing table so that a minimum of torque will be imparted through cables extending from the slip ring assembly to the air bearing table as such is rotated. The system includes two servo loops. The first servo loop includes a rate gyroscope carried on the air bearing table which generates a signal through a summing junction to be compared with a signal coming from a tachometer coupled to the slip ring assembly. The corrective signal is applied to a torque motor for rotating the slip ring assembly. The second servo loop includes a pair of photo detector cells which generate pulses responsive to the rotation of the air bearing table and slip ring assembly which are fed through a phase detector, and a variable gain amplifier to the summing junction circuit to provide a fine adjustment for rotating the slip ring assembly.
Official Gazette of the U.S. Patent Office

N75-13140 Rensselaer Polytechnic Inst., Troy, N.Y.
TRANSIENT IONIZING RADIATION EFFECTS IN TRAPATT DIODE OSCILLATORS Ph.D. Thesis
Henry J. Geipel, Jr. 1974 143 p
Avail: Univ. Microfilms Order No. 74-26075

The effects of transient ionizing radiation on S-band 30 watt pulsed TRAPATT diode oscillators have been evaluated. Both n-type and p-type devices were irradiated with 100 nsec pulses of 10 MeV electrons from a linear accelerator while operating in a multiple slug coaxial cavity designed for time delay triggering. A theoretical model was derived correlating the radiation-induced reverse saturation (leakage) current with the RF output power. The model includes the avalanche shock front build-up, plasma formation, plasma extraction, and a simple recovery transient. Voltage and current waveforms are obtained which reflect device physics and circuit interaction.
Dissert. Abstr.

N75-13141 Rensselaer Polytechnic Inst., Troy, N.Y.
MICROWAVE SCATTERING FROM DIELECTRIC GRATINGS Ph.D. Thesis
John William Maurer 1974 141 p
Avail: Univ. Microfilms Order No. 74-26087

The possibility of a grating of parallel cylindrical dielectric elements functioning as an inductive shunt susceptance was studied along with the range of grating parameters over which satisfactory inductive behavior can be obtained. It was found

that an equivalent shunt inductance can be obtained with the grating of dielectric elements over a limited range of physical properties and of frequencies. The limits were established by reversion to capacitive susceptance at the lower end of a frequency range, and by the effects of the fields internal to the dielectric cylinders at the high end. The dielectric grating does not have uniform behavior over a very broad frequency bandwidth that is provided by a wire grating. Two approaches to the grating analysis were used in formulating expressions for computation of the grating susceptance. In the first, the Rayleigh-Ritz procedure was applied to determine the coefficients. In the other approach, the scatter from each element was summed to obtain the grating reflection coefficient. Measurements with a waveguide simulation of the infinite grating show agreement with computed results.
Dissert. Abstr.

N75-13142 Ohio State Univ., Columbus.
ANALYSIS AND DESIGN OF HIGH BEAM EFFICIENCY APERTURE ANTENNAS Ph.D. Thesis
Carl Allan Mentzer 1974 219 p
Avail: Univ. Microfilms Order No. 74-24370

The lobe structure of small beamwidth aperture antennas is examined. The main beam pattern and its associated near-in sidelobes are computed used aperture integration techniques. The Geometrical Theory of Diffraction (G.T.D.) is used to obtain the far-out side and backlobes. Complete E-plane and H-plane patterns are made available for the pyramidal horn, the pyramidal corrugated horn, the horn-reflector, the corrugated horn-reflector, the offset fed parabola, and the dual-reflector antenna. These computed patterns are compared to experimental patterns. The slope wave diffraction process is extended simplifying the H-plane analysis of the conventional horn. The equivalent current concept of G.T.D. is extended to include a slope wave equivalent current. A dual version of slope wave diffraction is developed to obtain an analysis for the E-plane of the corrugated horn and an analysis of the horn-reflector geometry. The general side and backlobe characteristics of these antennas are reviewed in terms of their applicability to communication and radiometer systems.
Dissert. Abstr.

N75-13143 Mississippi State Univ., State College.
ENHANCING THE TESTABILITY OF SYNCHRONOUS SEQUENTIAL MACHINES WITH EMPHASIS ON LARGE SCALE INTEGRATED CIRCUITS Ph.D. Thesis
John Kent Owens 1974 108 p
Avail: Univ. Microfilms Order No. 74-24217

The performance of synchronous sequential machines to determine the most important aspects of fault detection was analyzed. Emphasis was placed on large scale integrated circuits. The methods of testing the machines are described and a method which presents shorter, more easily designed experiments is presented. A digital to analog converter and an additional output terminal are added to the basic machine. The output terminal brings the output signal from the converter to the outside and this signal completely specifies the state of the machine.
Dissert. Abstr.

N75-13144 Michigan Univ., Ann Arbor.
FINITE PHASED ARRAY ANALYSIS Ph.D. Thesis
Mohamed Mohamed Ali Hidayet 1974 123 p
Avail: Univ. Microfilms Order No. 74-25219

An analysis of mutual coupling effects in linear and planar finite phased arrays of rectangular slots in a perfectly conducting ground plane is presented. Internal waveguide modes with unknown coefficients are assumed. The electromagnetic field is evaluated in terms of the waveguide illuminations at the array aperture. The resulting infinite set of linear equations relating the illumination to the incident amplitudes in the guides is truncated. The augmented matrix equation relates the main mode illuminations to the main mode excitations and includes the effects of unexcited modes. Computer programs were developed for linear as well as planar arrays of both rectangular grid arrangement and isosceles triangular grid arrangement. The analysis is adaptable to finite arrays, and gives information related to the center element as well as any other element. The matrix thus calculated is scan-independent and represents information about the physical dimensions of the array and the geometry of the array grid. Nonuniformly spaced arrays are accommodated as well as uniformly spaced arrays, including nonuniformly filled arrays of uniform grids.
Dissert. Abstr.

N75-13145 Michigan Univ., Ann Arbor.
PROPERTIES OF AVALANCHE TRANSIT-TIME DEVICES Ph.D. Thesis
Charles Meng-Yuan Lee 1974 609 p
Avail: Univ. Microfilms Order No. 74-25246

The objectives of this study are two-fold. One is to develop a very general large-scale computer simulation model for semiconductor devices. The other is to simulate various Si avalanche diode structures operating in the IMPATT and TRAPATT modes at different operating conditions in order to investigate the effects of various parameters on the performance of these avalanche diodes. An explicit numerical method and an implicit one were developed to solve the set of partial differential transport equations which characterize the behavior of holes, electrons and electric field in semiconductor devices. These numerical models consider realistic characteristics for holes and electrons, arbitrary doping profile, distributed avalanche, arbitrary thermal-recombination lifetime and a diffusion constant calculated from the Einstein relation.
Dissert. Abstr.

N75-13146 Michigan Univ., Ann Arbor.
THEORETICAL AND EXPERIMENTAL STUDIES OF THE TUNING AND MODULATION PROPERTIES OF TRANSFERRED-ELECTRON DEVICES Ph.D. Thesis
Denny Duan-lee Tang 1974 248 p
Avail: Univ. Microfilms Order No. 74-25341

The device performance under two basic tuning methods was examined, namely, tuning through the bias voltage of the device and tuning through a resonant circuit. The tuning properties were derived from the interaction between the device and the circuit. Two conventional cavity circuits which were employed, namely, the post-mount waveguide cavity and the slug-tuned coaxial-line cavity, had already been modeled and well understood. The present study is therefore concentrated on the nonlinear properties of the transferred-electron device. To accomplish this objective the device is modeled and its operation is analyzed. A one dimensional model is developed to simulate the space charge dynamical behavior in the device. The space charge behavior is determined by the doping profile in the active region, the diffusion coefficient, the drift velocity of the carrier and the terminal voltage.
Dissert. Abstr.

N75-13147 Michigan Univ., Ann Arbor.
A STUDY OF MUTUAL COUPLING REDUCTION IN PHASED ARRAY ANTENNAS BY THE USE OF A TIME SHARING TECHNIQUE Ph.D. Thesis
Philip Gerald Girardi 1972 200 p
Avail: Univ. Microfilms Order No. 74-25374

Mutual coupling reduction in phased array antennas is theoretically described and experimentally studied. The mutual coupling interaction between the array elements is eliminated by sequentially radiating or receiving a signal from each array element, such that during the time in which the elements do not radiate or receive, they are shorted at their apertures. Each array element in turn 'sees' the same impedance, its self impedance, hence the mutual coupling is eliminated. The time gated signal is then averaged to recover continuous, coupling free information. The method is applied to an array of waveguide elements and the detailed problems of implementation are examined. A theoretical and experimental investigation of the modal coupling between adjacent waveguide apertures is included, as well as a study of the signal processing problems that arise in the use of this technique. An experimental investigation of a two element waveguide array implemented with the time domain coupling reduction technique is presented. The results show a significant reduction in the mutual coupling interaction.
Dissert. Abstr.

N75-13148 Virginia Univ., Charlottesville.
HIGH FREQUENCY NOISE IN SCHOTTKY BARRIER DIODES Ph.D. Thesis
Thomas John Viola, Jr. 1974 114 p
Avail: Univ. Microfilms Order No. 74-23250

Material selection and fabrication techniques are presented for constructing high frequency, millimeter wave, Schottky barrier

diodes with a cutoff frequency of 1000GHz and a 4-5db conversion loss. The measured equivalent noise temperatures of these diodes and commercial Schottky barrier diodes at 300 K, and 18 K did not agree with the values predicted by the established shot noise theory. It was experimentally determined that the discrepancy between the experimental and theoretical noise temperatures was due to the fact that the established noise theory did not allow for thermionic-field emission or field emission as the barrier transport mechanism but considered only thermionic emission. Dissert. Abstr.

N75-13149 Polish Academy of Sciences, Warsaw.
ASYMPTOTIC EXPRESSION FOR A FIELD IN AN OPEN WAVE WITH AN ACTIVATED LINEAR SOURCE [WYRAZENIE ASYMPTOTYCZNE DLA POLA W OTWARTYM FALOWODZIE POBUDZANYM ZRODLEM LINIOWYM]
Adam Ciarkowski 1974 21 p refs In POLISH
(Rept-10/1973) Avail: Issuing Activity

The reaction is discussed of a cylindrical electromagnetic wave with an open wave and the obtained dependencies approximating the electromagnetic asymptotic field taking into account the high frequency. The asymptotic theory of diffraction on plane screens, a theory based on concepts borrowed from geometric optics and from Keller's geometric theory of diffraction, is also presented. It was found that this theory does not suit structures composed of several screens lying in different planes. Direct reaction of an emitted field from a source with wave wall edges, and multiple diffraction initiated by the diffraction waves were also investigated. M.J.S.

N75-13150# Ibaraki Univ., Hitachi (Japan). Dept. of Mechanical Engineering.
LANGMUIR PROBE RESPONSE TO VELOCITY FLUCTUATIONS OF WEAKLY IONIZED GASES
Toshisuke Hiran and Tetsumi Sugiyama 19 Nov. 1974 29 p refs Backup document for AIAA Synoptic scheduled for publication in the AIAA Journal in Jun. 1975
Avail: NTIS HC $3.75

The variation of the current-voltage characteristic of a negatively biased, cylindrical probe with the velocity fluctuation of a weakly ionized, high-density gas was studied. The experiments were made using potassium-seeded propane-air combustion gas flows. By vibrating the probe in a uniform combustion gas flow, the only relative velocity between the probe and combustion gas was made to fluctuate. The phases of the ion current and gas velocity fluctuations were found to coincide with each other in the range of frequencies from 50 to 2500 cycles/sec. The ion current fluctuation was found to be directly proportional to the velocity fluctuation except for the cases of larger velocity fluctuations and smaller probe diameters. A comparison between an electrostatic probe and hot-wire anemometer was accomplished, and it was found that an electrostatic probe is a promising diagnostic tool for the study of turbulence in high temperature gases. Author

N75-13151# Sandia Labs., Albuquerque, N.Mex.
MEASUREMENT OF THE SURFACE CHARGE ON HOLLOW CYLINDRICAL INSULATORS USING THE KERR EFFECT
J. P. Brainard 1974 7 p refs Presented at the 6th Intern. Symp. on Discharges and Elec. Insulation in Vacuum, Swansea, UK, 15 Jul. 1974 Sponsored by AEC
(SLA-73-8019; Conf-740716-1) Avail: NTIS HC $3.25

The formation of positive charges on an insulator surface when high voltage is applied across a solid insulator placed between electrodes in a vacuum is discussed. The effect is apparently caused by electron multiplication on the insulator initiated by electron emission from the cathode. The positive charge attains a level such that secondary electrons are returned to the insulator with energies too low to produce further multiplication. The construction of the insulator-electrode is described. The method for conducting the investigation is reported. Author

N75-13152*# California Inst. of Tech., Pasadena. Dept. of Electrical Engineering.
SPACE CHARGE EFFECTS IN CURRENT TRANSPORT Final Report
30 Nov. 1974 17 p
(Grant NGL-05-002-100)
(NASA-CR-141115) Avail: NTIS HC $3.25 CSCL 09C

Developments on the subject of noise in single and double injection currents in solids are reviewed. Results are discussed in detail and a bibliography of published work in the field is provided. Conflicting findings and opinions are examined in the light of the present understanding of the subject. Author

N75-13153*# Magnavox Research Labs., Torrance, Calif.
TDRSS MULTIMODE TRANSPONDER PROGRAM. PHASE 2: EQUIPMENT DEVELOPMENT Final Report, Jul. 1972 - Oct. 1973
Richard S. Cnossen 15 Mar. 1974 186 p
(Contract NAS5-20330)
(NASA-CR-139155; R-4754) Avail: NTIS HC $7.00 CSCL 09C

This report contains a complete description of the TDRS Multimode Transponder and its associated ground support equipment. The transponder will demonstrate candidate modulation techniques to provide the required information for the design of an eventual VHF/UHF transponder suitable for installation in a user satellite, capable of operating as part of a Tracking and Data Relay Satellite (TDRS) systems. Use of geosynchronous TDRS which can serve both low data rate users at VHF and high data rate users at other frequencies has been considered. The effects of radio frequency interference from the earth and of multipath propagation due to reflections from the earth are expected to pose problems for the TDRS system at VHF. Investigations have suggested several modulation techniques that offer promise to overcome these problems. Author

N75-13154# Elektronikcentralen, Hoersholm (Denmark).
SWITCHING FILTERS [SWITCHEDE FILTRE]
J. Molgaard Aug. 1974 25 p refs In DANISH
(ECNO-09) Avail: NTIS HC $3.25

The properties of n-path filters are outlined and their applications as narrow band switching filters at audio frequencies are considered. Transl. by G.G.

N75-13155# National Aerospace Lab., Tokyo (Japan).
COMPUTER ANALYSIS OF LINEAR ELECTRIC CIRCUIT WITH A STORAGE TUBE GRAPHICAL DISPLAY AND RAND TABLET DEVICE
Toshio Isobe 1974 24 p refs In JAPANESE; ENGLISH summary
(NAL-TR-365) Avail: NTIS HC $3.25

The digital computer program for linear electric circuit analysis for CAD (Computer Aides Design) is described. It is shown how to process data of CAD programs and to have man machine communication. The program utilizes an on-line computer with a graphic terminal consisting of a storage tube graphical display and a Rand tablet device. The input to the program is given by drawing the network diagram on the face of the graphical terminal. The output of the program is displayed on the tube. In this program, the nodal analysis using node elimination method is employed, and a short element to make the description and process of data flexible is suggested. Author

N75-13156# Toulouse Univ. (France).
CONTRIBUTION OF THE STUDY OF THYRISTORS: DIRECT BLOCK REGIME, TRIGGER CLOSING Ph.D. Thesis [CONTRIBUTION A L'ETUDE DES THYRISTORS: REGIME DIRECT BLOQUE, DECLENCHEMENT FERMETURE]
Jean-Marie Dorkel 1974 130 p refs In FRENCH
Avail: NTIS HC $5.75

Two aspects of equipment function, block regime, and trigger closing in thyristors are discussed. Data cover physical parameters, fundamental structure, operating principles, and conduction. Data are also given on electrical phenomena, including limitations and conduction after the first microseconds of shut off. The simple analog of P-N-P-N structure was also analyzed.
Transl. by E.H.W.

N75-13157# Universite Scientifique et Medicale de Grenoble (France).
CONTRIBUTION OF THE STUDY OF CHARGE WAKES IN ELECTRICITY Ph.D. Thesis [CONTRIBUTION A L'ETUDE DES SILLAGES CHARGES D'ELECTRICITE]

Mamadou Wathe 28 Nov. 1972 127 p refs In FRENCH
Avail: NTIS HC $5.75

The problem of forced convection in electricity is studied. Factors covered during the study include the effects of ion diffusion, electric field alignment, and charge density distribution. Several equations and numerical procedures used in the study are given. Transl. by E.H.W.

N75-13158# AEL Service Corp., Colmar, Pa.
TEST REPORT RADIOFREQUENCY INTERFERENCE/ ELECTROMAGNETIC INTERFERENCE. MEASUREMENTS OAKLAND AIR ROUTE TRAFFIC CONTROL CENTER Final Report, Jan. - Nov. 1973
Margaretta V. Stone May 1974 221 p
(Contract DOT-FA72NA-728)
(AD-779746; FAA-NA-74-150; FAA-RD-74-28) Avail: NTIS HC $5.75

Electromagnetic interference tests at the Oakland Air Route Traffic Control Center (ARTCC), Oakland, California were described. The tests included measurement of radiated and conducted emission from both the automated system and nonautomated equipments, and radiated and conducted susceptibility of the automated system. It was concluded that the automated system equipment would not adversely affect the performance of other equipment used in its vicinity, provided that the other equipment met the susceptibility requirements of MIL-STD-461A or equivalent specifications. It was further concluded that the automated system is unlikely to be affected by electromagnetic interference generated within a typical ARTCC site, although radiated and conducted emission from the nonautomated equipment at the Oakland site exceeded MIL-STD-461A limits. It was recommended that revised emission and susceptibility limits be developed to reflect the specific requirements of FAA ARTCC sites. Author

N75-13159# Rome Air Development Center, Griffiss AFB, N.Y.
FAA LIGHTNING PROTECTION STUDY: LIGHTNING SIMULATION TESTS OF COMMUNICATION CABLES Final Report, 1 Nov. 1972 - 31 Jan. 1974
Richard M. Cosel, Andrew W. Revay, Jr., and James Stahmann Jan. 1974 105 p refs
(Contract DOT-FA72WAI-356; AF Proj. 9567)
(AD-779816; FAA-RD-74-71) Avail: NTIS HC $4.50

The degree of susceptibility of the Federal Aviation Administration electronic systems to induced electromagnetic pulse effects due to lightning was studied along with protective devices adequate for low voltage electronic systems. The measurement of inducted electromagnetic effects in typical FAA electronic cables under simulated lightning tests. Descriptions of the cables tested, the cable test list plan, the measurements performed, and the results of the testing are presented. A brief description of lightning effects and related data, description of the lightning simulation test equipment, a detailed bibliography of simulated lightning cable testing, and the FAA specifications for the cables tested are included. Author

N75-13160# California Univ., Livermore. Lawrence Livermore Lab.
PEAK CURRENT ESTIMATES: CYLINDERS IN FREE SPACE WITH EXTENSIONS TO OTHER STRUCTURES
J. A. Landt 15 Apr. 1974 27 p refs
(Contract W-7405-eng-48)
(UCID-1671) Avail: NTIS HC $3.75

A method is developed to estimate both the transient response of straight wire scatterers and the peak current induced on a straight wire. Extensions of the method included the effects of loading and the treatment of more complex structures. A sample work sheet and the necessary response curves are provided for peak current estimates. Author (NSA)

N75-13161# Sandia Labs., Albuquerque, N.Mex.
REVIEW OF HYBRID MICROELECTRONICS
C. M. Tapp and T. A. Wiley Jun. 1974 65 p refs
(Contract AT(29-1)-789)
(SLA-73-1063) Avail: NTIS HC $4.25

Experiences in the design, development, and production of hybrid microelectronics for war reserve nuclear systems are presented. The general time scales for hybrid microcircuit development and use is analyzed. The history of hybrid circuits is reviewed. The evolving early production and technology advances are discussed. Author

N75-13162# Sandia Labs., Albuquerque, N.Mex.
COMPILATION OF SPECIFICATIONS DESCRIBING HYBRID MICROCIRCUIT TECHNOLOGY
C. M. Tapp and D. J. Sharp Jun. 1974 218 p
(Contract AT(29-1)-789)
(SLA-74-0300) Avail: NTIS HC $7.25

A compilation of specifications describing hybrid microcircuit technology is presented. The specifications are divided into two categories of drawing numbers. One drawing number applies to special issue specifications and the process involved in fabricating hybrids. The other drawing number describes the materials used in the hybrid process. The quality control aspects of hybrid microcircuit production are explained. Author

N75-13163# Sandia Labs., Albuquerque, N.Mex.
HYBRID MICROCIRCUIT DESIGN GUIDE
Jul. 1974 97 p Sponsored by AEC
(SLA-74-0333) Avail: NTIS HC $4.75

A design guide for thin-film hybrid microcircuit technology is provided. Guidelines and constraints for laying out a hybrid circuit are developed. The availability of model hybrid microcircuits from a prototype facility is reported. Author

N75-13164# Los Alamos Scientific Lab., N.Mex.
METHODS OF ENERGY TRANSFER FROM A MAGNETIC ENERGY STORAGE SYSTEM USING A TRANSFER CAPACITOR AND A SUPERCONDUCTING SWITCH
D. M. Weldon and J. D. G. Lindsay May 1974 19 p refs
(Contract W-7405-eng-36)
(LA-5631-MS) Avail: NTIS HC $3.25

Three circuits for magnetic energy storage using a transfer capacitor and a superconducting switch are analyzed, and a set of equations are derived which can be used for parameter studies of these circuits. Author (NSA)

N75-13165# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
SELECTION OF ELECTROINSULATING MATERIALS FOR CRYOGENIC AND SUPERCONDUCTING DEVICES AND STUDY OF THEIR PHYSICAL PROPERTIES
N. G. Anishchenko and E. Yavorskii 1974 24 p refs In RUSSIAN; ENGLISH summary
(JINR-P8-7663) Avail: AEC Depository Libraries HC $4.25

The selection of electroninsulating materials for superconducting is considered. Short static tests make it possible to obtain fast enough the information about the mechanical properties of materials under cryogenic conditions. These tests are the following: (1) heat stroke by liquid nitrogen; (2) determination of frost resistant and glass temperatures; (3) determination of thermomechanical graphs; (4) determination of static mechanical properties, and (5) determination of the coefficient of thermal linear expansion. Some results of these investigations are presented. In particular, it is noted that the problem of the superposition of polymers and metals under cryogenic conditions arises and the knowledge about thermal expansions are extremely important for the epoxy compounds used for impregnating the winding of superconducting solenoids. Author (NSA)

N75-13166# Army Material Command, Texarkana, Tex. Intern Training Center.
DETERMINATION OF AN OPTIMAL ALLOCATION OF MOLECULES TO COMPONENTS USING THE GENERALIZED ELECTRONICS MAINTENANCE MODEL Final Report
James B. Beeson Apr. 1974 128 p refs
(AD-785500; USAMC-ITC-02-08-73-015) Avail: NTIS CSCL 15/5

This paper presents two techniques to be used with the generalized electronics maintenance model to facilitate system design by minimizing maintenance support cost. The methods developed can be used to optimally allocate modules to components with the lowest life cycle cost being the criteria for optimality. The computer techniques presented requires a good working knowledge of the GEMM model. In addition to a description of the techniques presented, an example of each

method is given to illustrate the input requirements and output generated. Author (GRA)

N75-13167# Army Electronics Command, Fort Monmouth, N.J.
SURFACE STUDIES FOR QUARTZ RESONATORS
J. R. Vig, C. F. Cook, K. Schwidtal, J. W. LeBus, and E. Hafner Sep. 1974 38 p refs
(DA Proj. 1S7-62705-AB-94)
(AD-785513; ECOM-4251) Avail: NTIS CSCL 09/1

Cleaning procedures for quartz resonators have been studied by Auger electron spectroscopy. The merits of cleaning by chemical methods, ion bombardment, ultraviolet radiation, and electron beam irradiation are discussed. Of all, irradiation by intense, short wave-length ultraviolet light is the simplest and most promising cleaning procedure. It can be used in ambient air as well as in a vacuum system. Parts stored in UV light apparently maintain their cleanness indefinitely; however, the oxidation of oxide forming metals is greatly accelerated by the process. The recontamination of resonators exposed to air is also discussed. The surface topographies and crystalline structures of polished quartz blanks, and of lapped blanks etched for various times, have been investigated by scanning electron microscopy (SEM) and reflection high energy electron diffraction (RHEED). The surface damage produced by polishing and lapping is discussed in terms of the SEM micrographs and RHEED patterns. The results for Lapped and etched surfaces are compared with the minimum etched specified by MIL-C-3098F. Author (GRA)

N75-13168# Purdue Univ., Lafayette, Ind.
ADVANCES IN POWER SYSTEM DYNAMICS AND CONTROL
Ahmed H. El-Abiad May 1974 19 p refs
(Grants NSF GK-16245; NSF GI-38315)
(PB-233929/9; NSF-RA/N-74-035) Avail: NTIS HC $3.25 CSCL 09C

Power system dynamics and control are reviewed from practical and physical points of view defining such concepts as: stability, security, and reliability. Basic models for power system dynamics are discussed and their various off-line and on-line applications are evaluated. A summary is given of planning and design concepts for improved transient and dynamic control of power system and emerging dynamic problems in electric power system operation and their solutions are reviewed. GRA

N75-13169# Whittaker Corp., San Diego, Calif. Narmco Research and Development Div.
CONTINUOUS PASS FLUORIDIZED WIRE COATINGS Technical Report, Oct. 1966 - Mar. 1967
Stanley Yalof Mar. 1967 18 p refs
(Contract F33615-67-C-1146)
(AD-784224; AFML-TR-67-132) Avail: NTIS CSCL 11/3

The program encompassed the determination of process parameters for the manufacture of continuous-length fluoridized wire; production runs of up to 25 feet for several wire substrates; and exploration of the variables associated with the preparation of fluoride dielectric wire coatings. Nickel chrome alloy substrates in an 80/20 proportion were found to produce the best coatings, having resistance greater than 100 megohms across the coating, toughness, abrasion resistance, and the ability to withstand repeated flexure. The properties of this nickel-chrome combination were superior to those of either one of its constituent elements. Unfortunately, the coatings produced during this abbreviated program were microscopically reticulated and, therefore, permeable to the salt bath solution used for the severe high-pot tests. As a result, conduction occurred at low voltage levels. (Modified author abstract) GRA

N75-13170# Westinghouse Electric Corp., Lima, Ohio. Aerospace Electrical Div.
HIGH TEMPERATURE GENERATOR COMPONENT DEVELOPMENT Final Technical Report, May 1972 - Jun. 1974
Robert C. Fear, Allen E. King, and William E. Neff Aug. 1974 238 p refs
(Contract F33615-72-C-1626; AF Proj. 3145)
(AD-786046; AFAPL-TR-74-69) Avail: NTIS CSCL 09E

Investigations of high temperature generator designs and generator components such as insulations, magnetic materials, diodes, and bearings for operation in a 600 F high altitude ambient are described. Interlaminar insulation coatings for cobalt iron magnetic sheet steels were investigated and best choices are identified. A new coil insulation system in the form of a rugged monolithic structure was developed using a new ceramic tape and an encapsulation of a compound of commercial glass. Dry lubricated bearing technology developments were extended to more than double the life over previous similar bearings. High temperature SiC diode technology developments were extended to more than double the rating over prior SiC diodes. A conceptual design of a lighter weight, higher power density synchronous generator utilizing these new components is presented having a specific weight of 2.3 lbs/kVA. Author (GRA)

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N75-13171 Michigan Univ., Ann Arbor.
A NUMERICAL STUDY OF THE EFFECTS OF INTENSE TRANSIENT HEATING IN A LAVAL NOZZLE Ph.D. Thesis
James Michael Novak 1974 264 p
Avail: Univ. Microfilms Order No. 74-25279

The numerical solution of the non-linear partial differential conservation equations that govern unsteady, inviscid, mixed subsonic-supersonic flow within a Laval nozzle is developed. Both a quasi-one-dimensional and an axisymmetric model are considered. The central problem of interest involves the effects on the internal nozzle gasflow of an intense, time-varying and spatially varying, bulk heat addition which simulates that due to Joulean heating from a coaxial electric arc. The purpose of the study is to relate the resulting transient flow phenomena to those that might exist in gas blast circuit breakers (which are widely used in the power industry for interrupting ultra-high voltage electrical systems) and to draw some conclusions regarding the design of such devices. The analysis places particular emphasis on the convective heat transfer processes within the nozzle and on the role that nozzle geometry plays in altering these processes. Dissert. Abstr.

N75-13172 Delaware Univ., Newark.
SLOW CONVERGING FLOWS OF VISCOELASTIC LIQUIDS Ph.D. Thesis
Jesse Raymond Black 1974 283 p
Avail: Univ. Microfilms Order No. 74-26117

Creeping planar flow of a viscoelastic liquid through a contraction between upstream and downstream sections of fully developed laminar flow has been studied by combining a numerical solution with a perturbation in Weissenberg number. Computations were carried out for contraction ratios of two to one and five to one and convergence entry half angles of 30 deg, 45 deg, 60 deg, and 90 deg. The numerical method is based on a procedure by Fichera and Hsiao and MacCamy which converts the solution of the biharmonic equation to the solution of a set of Fredholm integral equations for a density function along the system boundary. The stream function and all its derivatives are obtained by weighted integration of the density function. This removes the need to take third and fourth derivatives of the stream function by finite differences in order to calculate stresses. Dissert. Abstr.

N75-13173 California Inst. of Tech., Pasadena.
TWO PHASE FLOW IN VERTICAL AND ANNULAR FLUIDIZED BEDS, 1. UNSTEADY DISTURBANCES IN AXIAL COMPRESSORS, 2 Ph.D. Thesis
Blair Allen Folsom 1974 310 p
Avail: Univ. Microfilms Order No. 74-24439

A study of vertical and annular fluidized beds was conducted. The vertical fluidized bed was used to determine the responses of a total head probe and an electromagnetic probe to the average velocity through the bed. Both probes indicated velocities substantially higher than the calculated average fluid

velocity for the suspension. The fluidized bed consisted of glass beads suspended in water flow and had an aspect ratio of 20. An analytical study of unsteady disturbances in an axial compressor is presented. The blade forces were represented as a continuous distribution of body forces acting on the fluid and the equations of motion were linearized. Only axial variations in the mean flow were considered and the disturbances were limited to planar pressure and entropy waves. A numerical integration gave results that depended on frequency and indicated that the largest velocity fluctuations inside the compressor always occurred at either the front or rear. Dissert. Abstr.

N75-13174 Delaware Univ., Newark.
MOMENTUM, HEAT, AND MASS TRANSFER IN THE STAGNATION REGION OF A SURFACING PLUME Ph.D. Thesis
Joong-Sung Sihn 1974 181 p
Avail: Univ. Microfilms Order No. 74-26144

Analytical and finite-difference solutions have been obtained for the stream function in an axisymmetric, incompressible jet impinging normally on a flat, frictionless surface. The flow is assumed to be rotational but inviscid. The analytical solution, obtained for an initially Gaussian axial velocity profile, was found to be too cumbersome to be useful. Normalized velocities and distances are used so the finite-difference solutions can be presented in a form that, for specified initial velocity, includes all cases. The velocity profiles obtained numerically are used in conjunction with the constant-property energy equation, with negligible viscous dissipation, to compute the temperature field in the impingement region for typical initial temperature profiles. A constant eddy thermal diffusivity is assumed. Numerical solutions are obtained for a range of turbulent Peclet numbers. Dissert. Abstr.

N75-13175+ Engineering Sciences Data Unit, London (England).
FRICTION LOSSES FOR FULLY-DEVELOPED FLOW IN STRAIGHT PIPES OF CONSTANT CROSS SECTION: SUBSONIC COMPRESSIBLE FLOW OF GASES
Oct. 1974 29 p refs Supersedes ESDU-Aero-00.03.24 Sponsored by Roy. Aeron. Soc., Inst. of Chem. Engr., Inst. of Mech. Engr., and Inst. of Struct. Engr.
(ESDU-74029; ESDU-Aero-00.03.24) Copyright. Avail: NTIS HC $122.50

The friction factor data is applied to two cases of subsonic compressible flow. The method of application is given in the form of flow charts along with a brief outline of the derivation of approximate working equations. Author

N75-13176+ Engineering Sciences Data Unit, London (England).
FRICTION LOSSES FOR FULLY-DEVELOPED FLOW IN STRAIGHT PIPES
Sep. 1966 27 p refs Sponsored by Roy. Aeron. Soc. and Inst. of Mech. Engr.
(ESDU-66027) Copyright. Avail: NTIS HC $7.50

Frictional pressure losses associated with the flow of fluids in straight pipes are calculated. Data are given for both laminar flow and turbulent flow for a range of values of surface roughness. Both circular and noncircular cross sections are considered. Methods of solution of pipe flow problems are outlined. Distinguishing features are: a chart relating all the quantities involved by means of four dimensionless groups; formula for calculating the friction factor; a friction factor - Reynolds number chart. Guidance is given on the most appropriate method for various types of problems. Author

N75-13177 Polish Academy of Sciences, Warsaw.
HYDRODYNAMIC INTERPRETATION OF COMMON DIFFERENTIAL EQUATIONS AND ITS UTILIZATION IN ANALYSIS OF STABILITY [INTERPRETACJA HYDRODYNAMICZNA ROWNAN ROZNICZKOWYCH ZWYCZAJNYCH I WYKORZYSTANIE JEJ W BADANIACH STATECZNOSCI]
Andrzej Szadkowski 1974 141 p refs In POLISH
(Rept-49/1974) Avail: Issuing Activity

The problems of qualitative theory of differential equations, particularly the problem of the stability of the common differential equation solutions, are discussed. Integral curves were used for investigating this stability. Other topics discussed include: (1) nonautonomous common differential equations in Euclidean space; (2) analytic study of hydrodynamic interpretation of equations; (3) the properties of representations describing phase liquid and phase flow; and (4) the criteria of instability and stability of solutions. M.J.S.

N75-13178 California Inst. of Tech., Pasadena.
AN ANALYTICAL INVESTIGATION OF TURBULENT FLOW OVER A WAVY BOUNDARY Ph.D. Thesis
Doyle Dana Knight 1974 119 p
Avail: Univ. Microfilms Order No. 74-24444

The linearized, two-dimensional flow of an incompressible fully turbulent fluid over a sinusoidal boundary is solved using the method of matched asymptotic expansions in the limit of vanishing skin friction. A phenomenological turbulence model is utilized to incorporate the effects of the wavy boundary on the turbulence structure. Arbitrary lowest order wave speed is allowed in order to consider both the stationary wavy wall, and the water wave moving with arbitrary positive or negative velocity. Good agreement is found with measured tangential velocity profiles and surface normal stress coefficients. The phase shift of the surface normal stress exhibits correct qualitative behavior with both positive and negative wave speeds, although predicted values are low. Dissert. Abstr.

N75-13179 California Inst. of Tech., Pasadena.
NONSTEADY FLUID MECHANICS OF VEHICLES IN TUBES Ph.D. Thesis
Magdi Hanna Rizk 1974 147 p
Avail: Univ. Microfilms Order No. 74-24453

A theoretical study is performed to investigate the drag experienced by vehicle travelling in tubes, the pressure distribution and flow velocities resulting from the vehicle's motion. The study deals with both the cases of vehicles accelerating from rest in the tube and vehicles entering a tube at finite speed. The effect of having a vent in the tube is also studied. The unsteady compressible equations are used to describe the flow in the tube. Before the boundary layer fills the tube, an inviscid core-boundary layer formulation is used. However, it is found that the simpler one-dimensional formulation is adequate for describing the flow in the tube. The quasisteady near-field assumption agrees well with the unsteady near-field solution except for the initial period of low velocities. Dissert. Abstr.

N75-13180 Cornell Univ., Ithaca, N.Y.
A NUMERICAL INVESTIGATION OF STABLY STRATIFIED, WIND DRIVEN CAVITY FLOW BY THE FINITE ELEMENT METHOD Ph.D. Thesis
Keith Wilson Bedford 1974 223 p
Avail: Univ. Microfilms Order No. 74-24262

A model is presented to analyze steady state, stably stratified, wind driven circulation in cavities representing idealized lakes. A continuous but unknown density field is assumed. The density is stipulated on the surface and bottom of a cavity representing the minimum and maximum density difference. Viscosity, density gradient, diffusivity, and cavity length are represented by the Reynolds, Grashof, and Prandtl numbers, and the aspect ratio. Deep, square, and shallow cavities are analyzed for flow processes dominated by situations ranging from weak diffusion to strong nonlinear advection. In cases with strongly stratified flow or weak diffusion, two closed circulation cells form from the inability of the flow field to overcome density gradients. The velocity of the top cell is an order of magnitude more intense than the larger bottom cell. The circulation of the bottom cell is in the opposite direction to and driven by the surface cell. The results indicate the Reynolds, Grashof, and Prandtl numbers at which such cells first appear. Dissert. Abstr.

N75-13181 Cornell Univ., Ithaca, N.Y.
AN APPLICATION OF THE METHOD OF MULTIPLE SCALES TO PROBLEMS ARISING IN SUPERSONIC AERODYNAMICS AND STRATIFIED FLUID MECHANICS Ph.D. Thesis
Howard Mark Helfand 1974 155 p
Avail: Univ. Microfilms Order No. 74-24241

The method of multiple scales is applied to several hydrodynamic problems in this two-part study. The purpose of the first part is to generalize the multiple-scales method of Chikwendu and Kevorkian (1972) by applying it to four problems in supersonic aerodynamics. Principles and techniques are developed to guide

future applications of this generalized method. A mathematical model is developed to explain the recent internal wave observations of Hunkins and Fliegel (1973) in Seneca Lake. The method of multiple scales is used to derive the Korteweg-de Vries equation as the governing equation for nonlinear, two layer, shallow-water internal gravity waves. The internal waves predicted by the model are found to correlate well with the waves observed by Hunkins and Fliegel (1973). Dissert. Abstr.

N75-13182 Michigan Univ., Ann Arbor.
PERIODIC VORTEX SHEDDING IN THE TURBULENT WAKE OF A DISK Ph.D. Thesis
Mark Ahrens DeCoster 1974 156 p
Avail: Univ. Microfilms Order No. 74-25185

The periodic behavior of a turbulent wake behind a thin, sharp-edged disk was studied experimentally at a Reynolds number of 12,500 based on disk diameter. Velocity measurements were made using hot wire anemometers. The mean velocity, fluctuation intensity, periodic frequency, and periodic signal to noise ratio were measured for the circular disk as well as for various other thin axisymmetric shapes to compare the basic periodic properties of the various wakes. The Strouhal number was equal to 0.13 over a large Reynolds number range for all disk shapes if the length scale was based on the diameter of a circular disk with the same drag coefficient. A detection scheme was devised to allow conditional sampling of the periodic phenomenon without externally influencing the flow. Using these measurements it was found that the observed periodicity was due to a vortex pattern which developed within four diameters downstream of the disk. Dissert. Abstr.

N75-13183 Massachusetts Univ., Amherst.
TURBULENT DISPERSION IN DRAG REDUCING FLUIDS Ph.D. Thesis
Alan Richard Taylor 1974 220 p
Avail: Univ. Microfilms Order No. 74-25885

The effects of drag reducing polymers on turbulent dispersion from a point source in the core of a pipe flow are discussed. Dye concentration profiles were fitted to a Gaussian distribution using a non-linear regression technique. It was found that concentration profiles in Polyox (polyethylene oxide) solutions had a markedly reduced mean-squared-displacement compared to water. Data relating mean-squared-displacement to dispersion time was fitted to different dispersion models found from different forms for the Lagrangian correlation coefficient. All models were capable of fitting the data about equally well but predictions of turbulence parameters in water flows were superior using models containing a simple exponential decay. The results for Polyox solutions indicate a definite decrease in the radial turbulence intensity and an increase in the Lagrangian integral scale when compared to water. Dissert. Abstr.

N75-13184 Iowa State Univ. of Science and Technology, Ames.
A SECOND-ORDER METHOD OF CHARACTERISTICS FOR TWO-DIMENSIONAL UNSTEADY FLOW WITH APPLICATION TO TURBOMACHINERY CASCADES Ph.D. Thesis
Robert Anthony Delaney 1974 263 p
Avail: Univ. Microfilms Order No. 74-23729

A second-order method of characteristics numerical integration scheme is developed for solution of two-dimensional unsteady flows in gas dynamics. The method is applied to steady transonic flow analysis in turbine cascades with the steady state solution computed as the asympototic limit in time of a transient solution. Two cases of turbine cascade flows were solved. The first example involved subsonic flow throughout the cascade. The second example involved subsonic inlet and discharge flows, but with transonic flow over a portion of the cascade passage. In both cases, the computed results are compared with cascade experimental data. Generally good agreement between numerical solution data and experimental data is shown. Dissert. Abstr.

N75-13185 Michigan Univ., Ann Arbor.
AXISYMMETRIC FLOW AND STABILITY IN THE LOWER SYMMETRY REGIME OF A DIFFERENTIALLY HEATED ROTATING ANNULUS OF FLUID Ph.D. Thesis
Norman Alton McFarlane 1974 173 p
Avail: Univ. Microfilms Order No. 74-25267

A study is made of the axisymmetric steady state which occurs in the rotating annulus when the thermal Rossby number is small. An approximate solution of the governing equations for the axisymmetric state is obtained by the methods of singular perturbation theory. The higher order effects of centrifugal forces and convection in the side wall boundary layers in determining the structure of the velocity and temperature fields in the interior of the fluid is discussed. An analysis is made of the stability of the axisymmetric state also using the methods of singular perturbation theory. The first part of this analysis is concerned with the stability of wave-like disturbances with low wave numbers. It is shown that these will be stable if the thermal Rossby number is finite and sufficiently small. Dissert. Abstr.

N75-13186 Massachusetts Univ., Amherst.
FREE CONVECTION HEAT TRANSFER FROM A SLOWLY ROTATING CYLINDER Ph.D. Thesis
Lillian L. Goettler 1974 133 p
Avail: Univ. Microfilms Order No. 74-25912

Laminar convection heat transfer from a heated, slowly rotating horizontal cylinder to ambient air is examined analytically and experimentally. For rotational speeds below the critical speed for initiation of turbulence, laminar boundary layer equations are deduced and a parameter characterizing the influence of rotation on the free convective motion is established. Perturbation techniques and series truncation are used to solve the resulting elliptic equations. Interferometric studies of the temperature field are conducted and the results compared with the experiments of others and with the constant property theory. Dissert. Abstr.

N75-13187 Texas Univ., Austin.
HYDRODYNAMICS OF BUBBLE PLUMES INCORPORATING GAS TRANSFER IN STRATIFIED IMPOUNDMENTS Ph.D. Thesis
Fawzi Mustafa Rayyan 1974 220 p
Avail: Univ. Microfilms Order No. 74-24927

This research is directed toward the experimental determination of the hydrodynamics of bubble plumes in nonlinearly stratified impoundments taking into consideration the effect of gas transfer. A mathematical model describing the plume behavior is developed using the entrainment concept and calibrated with experimental data. The model predictions of the maximum height of rise were in good agreement with the observations for all lab and field studies. This good agreement was achieved using an entrainment coefficient of 0.040 for all lab studies and 0.055 for all field studies. In each case a temperature (density) spreading ratio of 1.25 and an air spreading ratio of 0.2 were used. Dissert. Abstr.

N75-13188 Texas Univ., Austin.
AN EXPERIMENTAL INVESTIGATION OF FREE CONVECTION HEAT TRANSFER IN A VERTICAL CYLINDER WITH A HEMISPHERICAL BOTTOM Ph.D. Thesis
Thomas Shannon Hunter, II 1974 232 p
Avail: Univ. Microfilms Order No. 74-24680

Transient natural convection heating of a bounded liquid was investigated. The test fluid was in contact with a wall at uniform temperature. An aluminum tank, a vertical cyclinder with a hemispherical bottom, was externally heated by water circulated through a constant temperature bath. Flow phenomena, made visible by an electrochemical process, were photographed. Tests were conducted at three aspect ratios, 0.5, 0.8, and 1.1. The Rayleigh number was varied from 4,000,000 to 500,000,000 by changing the depth of the heated liquid and the wall temperature. Radial lines were photographed in the heated liquid and showed vortices were present in the boundary layer. Correlations of the number of vortex pairs with a characteristic Rayleigh number and of the instantaneous Nusselt number with the instantaneous Rayleigh number were obtained. The dimensionless time was found to be a function of the tank diameter, rather than the fluid depth. Dissert. Abstr.

N75-13189# Indian Inst. of Science, Bangalore. Dept. of Applied Mathematics.
HEAT AND MASS TRANSFER AT A GENERAL THREE-DIMENSIONAL STAGNATION POINT
C. S. Vimala and G. Nath 6 Sep. 1974 36 p refs Backup document for AIAA Synoptic scheduled for publication in the AIAA Journal in Jun. 1975

Avail: NTIS HC $3.75

The simultaneous effects of heat and mass transfer at a general three-dimensional stagnation point is studied through the application of the method of parametric differentiation. The viscosity of the fluid is assumed to vary with the temperature according to the empirical power law relation. The variations of the critical wall parameters with the various physical parameters of the flow are presented. The effect of the variation of the density-viscosity product across the boundary layer is found to be appreciable only for low wall temperatures. Author

N75-13190*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

PREDICTION OF COMPRESSOR STALL FOR DISTORTED AND UNDISTORTED FLOW BY USE OF A MULTISTAGE COMPRESSOR SIMULATION ON THE DIGITAL COMPUTER

Carl J. Daniele and Fred Teren 1974 12 p refs Presented at 13th Aerospace Sci. Meeting, Pasadena, Calif., 20-22 Jan. 1975; sponsored by AIAA

(NASA-TM-X-71633; E-8171) Avail: NTIS HC $3.25 CSCL 20D

A simulation technique is presented for the prediction of compressor stall for axial-flow compressors for clean and distorted inlet flow. The simulation is implemented on the digital computer and uses stage stacking and lumped-volume gas dynamics. The resulting nonlinear differential equations are linearized about a steady-state operating point, and a Routh-Hurwitz stability test is performed on the linear system matrix. Parallel compressor theory is utilized to extend the technique to the distorted inlet flow problem. The method is applied to the eight-stage J85-13 compressor. Author

N75-13191*# Santa Clara Univ., Calif. Dept. of Mechanical Engineering.

RECENT ADVANCEMENT OF TURBULENT FLOW MEASUREMENT TECHNIQUES

Tom Battle, Peter Wang, and Dah Yu Cheng [1974] 7 p refs (Grant NGR-05-017-033)

(NASA-CR-141007) Avail: NTIS HC $3.25 CSCL 20D

Advancements of the fluctuating density gradient cross beam laser Schlieren technique, the fluctuating line-reversal temperature measurement and the development of the two-dimensional drag-sensing probe to a three-dimensional drag-sensing probe are discussed. The three-dimensionality of the instantaneous momentum vector can shed some light on the nature of turbulence especially with swirling flow. All three measured fluctuating quantities (density, temperature, and momentum) can provide valuable information for theoreticians. Author

N75-13192# National Aeronautical Lab., Bangalore (India).

NUMERICAL SOLUTIONS OF THE COMPRESSIBLE, LAMINAR BOUNDARY LAYERS WITH PRESSURE GRADIENTS AT LARGE PRANDTL NUMBERS

R. Gopinath and A. V. Murthy Aug. 1974 42 p refs Submitted for publication

(NAL-TN-29) Avail: NTIS HC $3.75

Numerical solutions of the compressible laminar boundary layers in a pressure gradient are presented for a range of Prandtl numbers from 1 to 30 for the wall insulated and cooled wall (g sub w = 0.2) cases for a typical pressure gradient parameter, beta = 0.2 A 'hump-hollow' behaviour in the enthalpy profile was observed for the cooled wall case with increase in Prandtl number. Systematic computer experiments on the effect of various parameters on the enthalpy profile showed that this behaviour was primarily a large Prandtl number phenomenon. Author

N75-13193*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

USE OF POTENTIAL FLOW THEORY TO EVALUATE SUBSONIC INLET DATA FROM A SIMULATOR-POWERED NACELLE AT CRUISE CONDITIONS

Lawrence J. Bober Washington Dec. 1974 26 p refs

(NASA-TN-D-7850; E-7472) Avail: NTIS HC $3.75 CSCL 20D

Incompressible potential flow theory corrected for compressibility effects, using the Lieblein-Stockman compressibility correction, was used to predict surface and flow field static pressures for a subsonic inlet at cruise conditions. The calculated internal and external surface static pressures were in good agreement with data at most conditions. The analysis was used to determine the capture stream-tube location and static-pressure distribution. Additive drag coefficients obtained from these results were consistently higher than those obtained using one-dimensional compressible flow theory. Increasing the distance between the inlet and boattail increased the cowl drag force. The effect of the boundary layer on internal and external surface static-pressure distributions was small at the design cruise condition. The analytical results may be used as an aid to data reduction and for predicting inlet mass flow, stagnation point location, and inlet additive drag. Author

N75-13194*# Scientific Translation Service, Santa Barbara, Calif.

COMPARATIVE STUDY OF THE HEAT TRANSFER OF A NOZZLE BLADE PROFILE IN A WIND TUNNEL AND IN AN AIR TURBINE

Ye. P. Dyban and V. D. Kurosh Washington NASA Dec. 1974 17 p refs Transl. into ENGLISH from the book "Konvektivniy Teploobmen" Kiev, Izdatelstvo Naukova Dumka, 1968 p 61-70

(Contract NASw-2483)

(NASA-TT-F-16060) Avail: NTIS HC $3.25 CSCL 21E

An investigation was made of the local and mean heat removal from a textolite nozzle blade in a wind tunnel with a thermal counter-current, and in the second cascade of an air turbine. Permalloy strips with wires glued on the nozzle blade were heated by a dc current during the tests. The flow turbulence level was markedly higher behind the rotor of an air turbine than in a typical wind tunnel. The mean heat removal coefficient increased with increasing Reynolds number. The laminar and transition boundary layers were appreciably smaller on a turbine nozzle blade than in the wind tunnel. Author

N75-13195*# Scientific Translation Service, Santa Barbara, Calif.

STUDY OF THERMAL PHENOMENA IN A HARTMANN-SPRENGER TUBE

E. Brocher and C. Maresca Washington NASA Dec. 1974 37 p refs Transl. into ENGLISH from Int. J. Heat Mass Transfer (England), v. 16, 1973 p 529-548

(Contract NASw-2483)

(NASA-TT-F-14796) Avail: NTIS HC $3.75 CSCL 14B

Intense heating is generated in the Hartmann-Sprenger tube by shock waves and by friction of the oscillating gas against the tube walls. This heat is removed chiefly by mass exchange between the hot gas in the tube and the cold gas of the jet, but forced convection inside the tube is also important. Equilibrium temperature of the hot gas can be calculated by the theory developed here. Author

N75-13196*# Kanner (Leo) Associates, Redwood City, Calif.

COMPUTATION OF THREE DIMENSIONAL FIELD OF MOTION IN CANALS AND BASINS USING HYDRODYNAMIC NUMERICAL METHODS

J. Suendermann Washington NASA Dec. 1974 95 p refs Transl. into ENGLISH from the German report

(Contract NASw-2481)

(NASA-TT-F-16070) Avail: NTIS HC $4.75 CSCL 20D

The treatment of hydrodynamic problems by numerical methods is extended to three dimensions. The models, based on the method of Hansen, can be used to obtain detailed information on the vertical structure of the velocity fields. The examples presented are restricted to wind-induced and tide-induced processes in schematic canals and basins, mostly of constant depth. For these relatively simple models, the numerical questions involved with extending the method to three dimensions can be seen very clearly. Two essential steps have been taken to make the models conform well to natural conditions: allowing for an arbitrary depth profile, and incorporating a boundary layer near the bottom. Author

N75-13197*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

TABLE AND CHARTS OF EQUILIBRIUM NORMAL SHOCK AND SHOCK-TUBE SOLUTIONS FOR PURE HYDROGEN WITH VELOCITIES TO 70 km/sec

Charles G. Miller, III and Sue E. Wilder Washington 1974

230 p refs
(NASA-SP-3087) Avail: NTIS HC $7.50 CSCL 20D

Equilibrium thermodynamic and flow properties are presented in tabulated and graphical form for moving, standing, and reflected normal shock waves in pure hydrogen. Properties include pressure, temperature, density, enthalpy, speed of sound, entropy, molecular-weight ratio, isentropic exponent, velocity, and species mole fractions. Incident (moving) shock velocities were varied from 4 to 70 km/sec for a range of initial pressure of 5 N/sq m to 100 kN/sq m. The present results are applicable to shock tube flows and to free-flight conditions for a blunt body at high velocities. Working charts illustrating idealized shock tube performance with hydrogen test gas and heated helium and hydrogen driver gases are also presented. Author

N75-13198*# Martin Marietta Corp., Denver, Colo.
THERMAL RADIATION ANALYSIS SYSTEM (TRASYS)
Robert J. Connor, Ronald E. Paulson, Richard G. Goble, and Carl L. Jensen May 1974 278 p
(Contract NAS9-13033)
(NASA-CR-140373; MCR-74-107) Avail: NTIS HC $8.75 CSCL 20M

A user's manual is presented for TRASYS, which is a digital software system with a generalized capability for solving radiation problems. Subroutines, file, and variable definitions are presented along with subroutine and function descriptions for the pre-processor. Definitions and descriptions of components of the processor are also presented. F.O.S.

N75-13199# National Aerospace Lab., Tokyo (Japan).
AN ANALYSIS FOR DOWNWASH BEHIND OSCILLATING CASCADES
Teruo Ichikawa 1974 14 p refs In JAPANESE; ENGLISH summary
(NAL-TR-373) Avail: NTIS HC $3.25

An approximate theory is developed for analyzing downwashes behind oscillating two dimensional cascades having an infinite number of blades. The calculation procedure is greatly simplified by concentrating bound vortices on the blades other than the reference blade to their quarter chord points and also by assuming that the downwash on the reference blade induced by these concentrated vortices can be represented by its value at the three quarter chord point. It is disclosed that, both in the circulation and the downwash, limiting values when the frequency tends to zero are not equal to steady values and that the downwash becomes substantially a traveling wave of constant amplitude only after a short distance from the cascade. Circulations and downwashes are calculated for various reduced frequencies and blade spacings. The results show that, both in circulations and downwashes, variations in the real parts against the reduced frequency are small and those in the imaginary parts are approximately linear. Effects of the blade spacing are large in the circulation but are small in the downwash. A ratio of the downwash on a center plane of two adjacent blades to that on a blade plane becomes unity when the frequency or the spacing tends to zero, and decreases when a product of the reduced frequency and the spacing increases. Author

N75-13200# Los Alamos Scientific Lab., N.Mex.
TWO-FREQUENCY NONLINEAR TAYLOR INSTABILITY
G. N. White Apr. 1974 8 p refs
(Contract W-7405-eng-36)
(LA-5575-MS) Avail: NTIS HC $3.25

The two-dimensional nonlinear motion of a Taylor unstable interface between an inviscid, incompressible fluid and a vacuum is calculated for initial disturbances composed of two waves of different frequency and amplitude. The interface position is computed with Lagrangian hydrodynamics using Hayes' boundary integral equation method for the time dependent velocity potential. For the initial combination of short wave with small amplitude and a long wave with larger amplitude the calculations show the short wave growth to be increased slightly in the upward moving long wave bubble and to be significantly reduced in the downward accelerating long wave spike. For the initial combination of waves of comparable amplitude less can be said because of the difficulty of calculating late time motion dominated by the faster growing short waves. The short wave growth behavior is shown to be caused by the additional potential introduced by the long wave acceleration. The dependency of the short wave growth on the frequency and amplitude ratios of the waves is examined in a number of calculations. Author (NSA)

N75-13201# Argonne National Lab., Ill.
ANNOTATED BIBLIOGRAPHY ON FLOW INDUCED VIBRATIONS
T. M. Mulcahy and S. S. Chen Jan. 1974 127 p refs
(Contract W-31-109-eng-38)
(ANL-CT-74-5) Avail: NTIS HC $5.75

References and annotations on flow-induced vibrations were compiled as part of the process of determining available information which could be useful in the prediction of the flow-induced vibrations of the internal components of reactors. Particular emphasis was given to surveying analytical prediction methods and results, experimental data and methods, as well as scale modeling practices, procedures, and results. Author (NSA)

N75-13202# Los Alamos Scientific Lab., N.Mex.
CALCULATION OF STEAM FLOW AND HYDRAULIC FRACTURING IN A POROUS MEDIUM WITH THE KRAK CODE
C. E. Keller, A. H. Davis, and J. N. Stewart, Jr. May 1974 23 p refs
(Contract W-7405-eng-36)
(LA-5602-MS) Avail: NTIS HC $3.25

A computer program named KRAK was developed for calculating the flow of steam and water in a porous medium and also the growth of a crack produced by the high pressure fluid. The program is written for a two-dimensional cylindrically symmetric geometry. The model treats the thermodynamics of the two-phase steam-water system accurately. It also takes into account heat conduction through the porous medium and between the medium and the fluid. Crack growth is treated in a quasistatic approximation, but within this limitation the detailed crack shape is obtained. Darcy flow is assumed within the porous medium, but fluid flow in the crack itself is calculated accurately from the equations for flow between parallel plates for all ranges of the Reynold's number. A suite of illustrative calculations is given showing the dependence of crack growth rates on the main parameters of the problems. Author (NSA)

N75-13203# Sandia Labs., Livermore, Calif.
NUMERICAL STUDY OF NATURAL CONVECTION INSIDE A HORIZONTAL CYLINDER WITH ASYMMETRIC BOUNDARY CONDITIONS
R. J. Kee Jul. 1974 250 p refs
(Contract AT(29-1)-789)
(SLL-74-0242) Avail: NTIS HC $7.50

Three numerical techniques were developed to predict the two-dimensional, transient, natural convection heat transfer within a horizontal cylinder. The techniques are explicity, ADI, and a new technique which is a hybrid between ADI and explicit. The hybrid method was found to be very much faster than the more conventional methods. All methods solve the full momentum (Navier-Stokes) and thermal energy equations in the stream function-vorticity framework. The present methods accommodate completely arbitrary temperature boundary conditions. The present techniques do not require that the problem be in an annulus or that it be symmetric so that solution can be done on a half cylinder. Also, considered were the differences resulting from using the constant property equations and the variable property equations. Both solutions were compared to the data of Martini and Churchill (1960). Additionally, constant property solutions were shown to be in excellent agreement with the steady state data of Zimin (1972) and the transient data of Erb (1965) and Hauf and Grigull (1970). Author (NSA)

N75-13204# Sandia Labs., Livermore, Calif.
DENSE FLUID SHEAR VISCOSITY AND THERMAL CONDUCTIVITY VIA NONEQUILIBRIUM MOLECULAR DYNAMICS
W. T. Ashurst Jun. 1974 189 p refs
(Contract AT(29-1)-789)
(SLL-74-0013) Avail: NTIS HC $7.00

A fluid transport calculation by computer simulation using nonequilibrium molecular dynamics is presented. Shear viscosity

of soft spheres has been obtained from molecular dynamic modeling of Couette flow. An important advantage on the nonequilibrium molecular dynamics is the characterization of nonequilibrium distribution functions. An extension of the results provides the basis for a perturbation theory of transport. Author

N75-13205# Sandia Labs., Albuquerque, N.Mex.
CORRELATION OF REENTRY BASE PRESSURE IN LAMINAR HYPERSONIC FLOW
B. M. Bulmer Aug. 1974 34 p refs
(Contract AT(29-1)-789)
(SLA-74-0169) Avail: NTIS HC $3.75

Base pressure data from four slightly blunted slender-cone reentry vehicles have been compared with available theory and ground flight test data for similar configurations. The present data for for Mach numbers of 16 to 20 show the expected dependence on Reynolds number from 200,000 to 5 times 10 to the 7th power in laminar hypersonic flow and, in general, show good agreement with other hypersonic flight data. General agreement with ground test results was also observed, taking into consideration differences caused by variable test gas composition, different wall-to-total enthalpy ratio, and real-gas and nose-bluntness effects. The flight data indicate a strong influence of slight nose bluntness at high Reynolds numbers. This behavior is attributed to local cone boundary layer edge property variations resulting from entropy-layer (or shock curvature) effects. Author

N75-13206# Los Alamos Scientific Lab., N.Mex.
TRANSIENT DYNAMICS OF CHEMICALLY REACTIVE GASEOUS MIXTURES WITH TURBULENCE
W. C. Rivard, W. C. Butler, and O. A. Farmer 1974 8 p refs Presented at the 4th Intern. Conf. on Numerical Methods in Fluid Dyn., Boulder, Colo., 23 Jun. 1974
(Contract W-7405-eng-36)
(LA-UR-74-931) Avail: NTIS HC $3.25

A computer program to study the mixing dynamics and finite rate chemical reactions in multicomponent gaseous mixtures with application to continuous wave chemical lasers was developed. The computer program solves the full, time-dependent, Navier-Stokes equations with coupled species transport, finite rate chemistry, and turbulence in two space dimensions. An internal energy equation is solved in place of a total energy equation to obtain a more accurate temperature field because of its importance in the species diffusion and chemical rate equations. The effects of turbulence are described by a turbulence model which uses a separate transport equation to determine the turbulent kinetic energy. Author

N75-13207# Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
EVALUATION OF METHODS USED TO DETERMINE TEMPERATURES OF CONVECTIVELY HEATED SOLID SURFACES
J. D. Randall Jan. 1974 49 p refs Sponsored by AEC
(ANSP-M-7) Avail: NTIS HC $3.75

A survey of several explicit numerical methods for calculating the surface temperature of a one dimensional slab subjected to convective heating is presented. The surface conductance and all thermal properties are assumed to the constant. Graphical comparisons of numerical and exact solutions are presented. Some rules of nodal definition based on consistency requirements are established. Author (NSA)

N75-13208# Los Alamos Scientific Lab., N.Mex.
NUMERICAL SOLUTION OF MELT FLOW AND THERMAL ENERGY TRANSFER FOR THE LITHOTHERMODYNAMICS OF A ROCK-MELTING PENETRATOR
R. D. McFarland May 1974 20 p refs
(Contract W-7405-eng-36)
(LA-5608-MS) Avail: NTIS HC $3.25

A finite-difference numerical method is described for computing the steady-state thermal and hydrodynamic characteristics of the melt flow around a heated rock-melting penetrator of arbitrary axisymmetric geometry. The major operating and performance results obtained from these calculations are heated-surface power, required thrust load, and the thickness profile of the melt layer. The method described has been incorporated in a computer program, and some typical results are presented. Author (NSA)

N75-13209# Los Alamos Scientific Lab., N.Mex.
INVARIANT DECOMPOSITION OF THE EQUATIONS GOVERNING HYDRODYNAMIC FLOW AND THERMAL CONDUCTIVITY
J. Nachamkin Apr. 1974 3 p refs
(Contract W-7405-eng-36)
(LA-5547-MS) Avail: NTIS HC $3.25

The equations of hydrodynamics and thermal conductivity are spectrally decomposed using the properties of the (2L + 1) representations of the rotation group in three dimensions. The decomposition and subsequent set of nonlinear partial differential equations are derived using the properties of the spherical harmonics. Author

N75-13210# Los Alamos Scientific Lab., N.Mex.
AYER HEAT CONDUCTION COMPUTER PROGRAM
R. G. Lawton May 1974 27 p refs
(Contract W-7405-eng-36)
(LA-5613-MS) Avail: NTIS HC $3.75

A finite element computer program for inputting data for solving the general two-dimensional equation of thermal conduction for plane or axisymmetric bodies was developed. Material properties can be time- and/or temperature-dependent, thermal conductivity can have general two-dimensional anisotropy, and three-dimensional material velocity distribution is allowed. Because the input is programmed by the user, the complexity of the input is directly related to the complexity of the problem. Author

N75-13211# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EJECTING CAPACITY OF EJECTOR WITH MIXING CHAMBER
V. V. Bondarenko, V. G. Lisienko, and B. I. Kitaev 23 Apr. 1974 11 p refs Transl. into ENGLISH from Vop. Sovershenstv. Stroit. Sb. Nauchn. Tr. (USSR), no. 91, 1971 p 207-212
(AD-779832/5; FTD-HT-23-808-74) Avail: NTIS HC $3.25 CSCL 12/11

The aim of the studies is to explain the effect of geometrical parameters on the work of ejectors with a short mixing chamber under conditions of isothermality and equal densities in the ejecting and ejected mediums. GRA

N75-13212# Ohio State Univ. Research Foundation, Columbus.
DEVELOPMENT AND APPLICATION OF THE ELECTRON BEAM FLUORESCENCE TECHNIQUE FOR VISUALIZING HYPERSONIC HIGH TEMPERATURE AIRFLOWS Interim Report, 1 Nov. 1971 - 15 Sep. 1973
H. F. Lee and S. L. Petrie Mar. 1974 50 p refs
(Contract F33615-72-C-1023; AF Proj. 1426)
(AD-783242; AFFDL-TR-74-24) Avail: NTIS CSCL 20/4

The electron beam fluorescence technique has been employed for visualizing hypersonic airflows. A high current electron beam generator was used to provide electron beams with currents up to 20 ma at voltages up to 40 kV. Applications of the technique at low densities illustrate that many details of the flow field can be obtained in density regions where conventional optical systems fail to yield useful results. The value and versatility of the method is demonstrated by results obtained with a sharp cone model and advanced ramjet aircraft configuration in a Mach 10 airflow. Techniques for obtaining quantitative density measurements with photographic and/or photomultiplier techniques are discussed. Author (GRA)

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N75-13213* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HALL EFFECT MAGNETOMETER Patent
John A. Woollam, Harry A. Beale, and Ian L. Spain, inventors (to NASA) Issued 26 Nov. 1974 4 p Filed 30 Jan. 1973 Supersedes N73-29437 (11 - 20, p 2419) Continuation-in-part of US Patent Appl. SN-254173, filed 17 May 1972
(NASA-Case-LEW-11632-2; US-Patent-3,849,875; US-Patent-Appl-SN-327969; US-Patent-Class-29-592; US-Patent-Class-29-571; US-Patent-Class-307-309; US-Patent-Class-317-235H; US-Patent-Class-330-6; US-Patent-Appl-SN-254173) Avail: US Patent Office CSCL 14B

A magnetometer which uses a single crystal of bismuth selenide is described. The rhombohedral crystal structure of the sensing element is analyzed. The method of construction of the magnetometer is discussed. It is stated that the sensing crystal has a positive or negative Hall coefficient and a carrier concentration of about 10 to the 18th power to 10 to the 20th power per cubic centimeter. Official Gazette of the U.S. Patent Office

N75-13214 Ohio State Univ., Columbus.
WHOLE FIELD DISPLACEMENT MEASUREMENTS BY HOLOGRAPHIC INTERFEROMETRY WITH APPLICATION ON SONIC TRANSDUCERS Ph.D. Thesis
Roger Alphee Allaire 1974 106 p
Avail: Univ. Microfilms Order No. 74-24287

Holographic interferometry was used to study several sonic transducers. These transducers are shaped, circular (cross section) resonating systems driven by a sandwiched piezoelectric ceramic. The simple resonator, the P-7, and P-11 transducers were studied. The investigations were performed to accurately determine their dynamic system mode shapes. Holographic interferometry was used because it is a whole field, noncontacting measurement procedure. It was applied to achieve quantitative results in determining the two dimensional axisymmetric mode shapes. Holography was also extended by examination and evaluation of interferometric localization. Evaluation of the accuracy obtained with interference localization was accomplished with a statistically deflected cantilever beam. The heavy influence of fringe width was critical. Superimposed displacements were applied as a fringe sharpening device to improve results. Localization was also applied to the resonator for verification of its applicability to single hologram, two dimensional mode shape analysis. Dissert. Abstr.

N75-13215 Michigan Univ., Ann Arbor.
GRATING-BASED INTERFEROMETERS AND THEIR APPLICATIONS Ph.D. Thesis
Byung Jin Chang 1974 203 p
Avail: Univ. Microfilms Order No. 74-25170

This dissertation is a theoretical and experimental study of space-invariant grating-based interferometers and their applications. A general, first-order theory is developed describing the basic properties of these interferometers which employ diffraction gratings both as beam splitters and as beam deflectors. Emphasis is on such aspects as fringe localization and the modulation transfer function exhibited by such systems when they are used for forming holograms. The analysis is based on a very generalized structural configuration and on illuminating sources of arbitrary spectrum and extension. The study stresses the great significance of the dispersive property of gratings to interferometry; it is indeed this property which makes such interferometers achromatic. An unlimited number of high contrast, high quality fringes can be obtained, regardless of the temporal and spatial coherence of the source. Dissert. Abstr.

N75-13216*# Chicago Univ., Ill. Enrico Fermi Inst.
DEVELOPMENT OF AN ALPHA SCATTERING INSTRUMENT FOR HEAVY ELEMENT DETECTION IN SURFACE MATERIALS Final Report
Anthony L. Turkevich, Thanasis Economou, Edwin Blume, and Wayne Anderson Dec. 1974 50 p refs
(Grant NGR-14-001-250)
(NASA-CR-141009) Avail: NTIS HC $3.75 CSCL 14B

The development and characteristics of a portable instrument for detecting and measuring the amounts of lead in painted surfaces are discussed. The instrument is based on the ones used with the alpha scattering experiment on the Surveyor lunar missions. The principles underlying the instrument are described. It is stated that the performance tests of the instrument were satisfactory. Author

N75-13217*# Princeton Univ., N.J. School of Engineering and Applied Science.
ACOUSTICS OF THE PIEZO-ELECTRIC PRESSURE PROBE
G. S. Dutt Aug. 1974 33 p refs
(Grant NGL-31-001-005)
(NASA-CR-14111; Rept-1179) Avail: NTIS HC $3.75 CSCL 14B

Acoustical properties of a piezoelectric device are reported for measuring the pressure in the plasma flow from an MPD arc. A description and analysis of the acoustical behavior in a piezoelectric probe is presented for impedance matching and damping. The experimental results are presented in a set of oscillographic records. M.C.F.

N75-13218*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
FLUID MASS SENSOR Patent Application
G. L. Fogal, inventor (to NASA) (GE, Philadelphia) Filed 7 Nov. 1974 14 p Sponsored by NASA
(Contract NAS9-13519)
(NASA-Case-MSC-14653-1; US-Patent-Appl-SN-521816) Avail: NTIS HC $3.25 CSCL 14B

An apparatus and method for accurate measurement of a fluid mass in real time are described. The system is effective under conditions of reduced gravity and is used for urine collection and measurement during space flight. Diagrams of the device are provided. The system and method can be incorporated into other applications for fluid volume measurement where mixed flow conditions (fluid-gas) exist. NASA

N75-13219*# National Aeronautics and Space Administration, Washington, D.C.
ELECTRONIC TEST INSTRUMENTATION AND TECHNIQUES: A COMPILATION Technology Utilization
[1974] 28 p
(NASA-SP-5907(03)) Avail: NTIS HC $1.00 CSCL 14B

The uses of test equipment and techniques used in space research and development programs are discussed. Modifications and adaptations to enlarge the scope of usefulness or divert the basic uses to alternate applications are analyzed. The items of equipment which have been of benefit to professional personnel in the enlargement and improvement of quality control capabilities are identified. Items which have been simplified or made more accurate in conducting measurements are described. Author

N75-13220# Central Electricity Generating Board, London (England).
IMPROVED DISPLAYS FOR ULTRASONIC TESTING
H. Harper Nov. 1974 6 p refs Repr. from CEGB Digest (London), v. 26, no. 11, abstracts 1106-1213, Nov. 1974 p 9-13
Avail: NTIS HC $3.25

The development of an ultrasonic flaw detector and the techniques for its employment are discussed. The detector provides a visual image of the object under test as seen by the ultrasonic waves. A block diagram of the circuitry is provided. Photographs of the imagery obtained on the display device are included. Author

N75-13221# Materials Research Labs., Maribyrnong (Australia).
MODIFICATION AND USE OF A STANTON TC-1 THERMAL CONDUCTIVITY APPARATUS

B. C. Ennis and R. M. Hess Sep. 1974 18 p refs
(MRL-TN-353) Avail: NTIS HC $3.25

The Stanton TC-1 Thermal Conductivity Apparatus for determination of thermal conductivity of solid materials, in the range 0.01-2.0 w/(m.K), was evaluated and found to be unsuitable for some rubber compositions. The temperature measurement and heating control of the equipment have been extensively modified so that its operation is simpler and more rapid and is independent of sample composition. For materials of low thermal conductivity, in the range 0.1-0.4 w/(m.K), such as typical plastics and rubbers, an accuracy of better than 10% and a reproducibility of better than 5% can be expected of the modified equipment. Author

N75-13222*# Scientific Translation Service, Santa Barbara, Calif.
PERFORMANCE CHARACTERISTICS OF A HELIUM-3 COOLED SEMICONDUCTOR BOLOMETER FOR ASTRONOMICAL INFRARED SPECTROSCOPY
R. Katterloher Washington NASA Dec. 1974 42 p refs Transl. into ENGLISH from the German report MPI-PAE/TB-14 (Contract NASw-2483)
(NASA-TT-F-16077; MPI-PAE/TB-14) Avail: NTIS HC $3.75 CSCL 14B

Bolometers, photosemiconductors, Josephson detectors, and pyroelectrical detectors are analyzed for a high altitude infrared spectroscopy balloon experiment. Various noise sources are considered, including current fluctuations, photo noise, phonon noise, thermal noise, generation-recombination noise, and flicker noise. Operational data are calculated for a bolometer and a design analysis is made. A design for a Helium-3 cryostat is provided. Author

N75-13223# Aeronautical Research Labs., Melbourne (Australia).
INTERFACE COMPENSATION IN DIGITALLY IMPLEMENTED ACOUSTIC HOLOGRAPHY SYSTEMS
A. J. Farrell Apr. 1974 26 p refs
(ARL/Inst-NOTE-79) Avail: NTIS HC $3.75

A method is proposed for overcoming the distortion in acoustic hologram images caused by refractions at an acoustic interface between the object to be visualized and the detection plane. Computer simulations are included to demonstrate the efficacy of the method. Author

N75-13224# Elektronikcentralen, Hoersholm (Denmark).
SURFACE MEASUREMENT BY MICROELECTRONICS [OVERFLADEMALING PA MICROELEKTRONIK]
Karen Houlberg Jun. 1974 103 p refs In DANISH; ENGLISH summary
(ECR-42) Avail: NTIS HC $5.25

Surface measurements on microelectronic specimens by means of a stylus type instrument are reported. The measuring equipment is described and an introduction of the relevant definitions and parameters such as profile, roughness, camber and thickness of layers are given. Surface measurements on thickfilm circuit on ceramic substrate, thinfilm circuit on glass substrate, and a semiconductor components are carried out. Profile and roughness value plus a scanning electron microscope picture or an ordinary picture are compiled for each specimen measured. Sources of error in measuring surfaces with a stylus are described and illustrated. Author

N75-13225# Aeronautical Research Labs., Melbourne (Australia).
THE EFFECTIVE APERTURE OF MASKED DETECTORS
A. J. Farrell Apr. 1974 23 p refs
(ARL/Inst-Note-81) Avail: NTIS HC $3.25

The effective aperture of masked piezoelectric detectors was observed under certain conditions to be less than expected. The effect is explained in terms of internal acoustic absorption and reflection within the mask. Author

N75-13226*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
TRAFFIC SURVEY SYSTEM Patent Application
Joseph H. Kerr, inventor (to NASA) Filed 11 Dec. 1974 16 p
(NASA-Case-MFS-22631-1; US-Patent-Appl-SN-531572) Avail: NTIS HC $3.25 CSCL 14E

A traffic survey system is described in which an aerial photo survey transparency is first made of a significant survey area. The transparency is then optically scanned to check the position and size of vehicles on roadways in the area. By computer control comparison with a reference transparency wherein areas other than roadways are made opaque and roadways are made clear, scanning is directed solely to roadway regions. Vehicle size analysis is accomplished by means of discrete holographic filters corresponding to selected size vehicles. NASA

N75-13227*# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.
HIGH TEMPERATURE STRAIN GAGE CALIBRATION FIXTURE Patent Application
Thomas Vranas, inventor (to NASA) Filed 19 Dec. 1974 11 p
(NASA-Case-LAR-11500-1; US-Patent-Appl-SN-534266) Avail: NTIS HC $3.25 CSCL 14B

An apparatus and a method for calibrating strain gages in both the dead weight and constant deflection modes are described. A diagram of the equipment is provided. A cantilever support arm allows the test unit to slide into a furnace while one end is subjected to bending strain either by hanging weights on it or by deflecting it with a push rod. The dual nature of the fixture permits both tests to be run without change of the test specimen or removal from the furnace. The apparatus permits conducting calibration tests up to a temperature of 1600 F. NASA

N75-13228# Sandia Labs., Albuquerque, N.Mex.
DESIGN AND CONSTRUCTION OF A LOW-VELOCITY BOUNDARY LAYER TEMPERATURE PROBE
B. F. Blackwell and R. J. Moffat 1974 4 p refs Presented at Thermophysics and Heat Transfer Conf., Boston, 15 Jul. 1974 Sponsored by AEC
(SLA-74-5406; Conf-740705-3) Avail: NTIS HC $3.25

The results are presented of a study performed to determine the geometry and thermal characteristics for a low-velocity boundary-layer temperature probe capable of eliminating conduction errors. Design curves for four common thermoelectric pairs are presented and an experimental turbulent boundary-layer temperature profile is compared with the theoretical laminar sublayer equation to verify that the probe eliminates conduction errors. Author

N75-13229# Sandia Labs., Albuquerque, N.Mex.
SHAKING-TABLE TESTS OF THE NGC-23 WIDEBAND VELOCITY SEISMOMETER SYSTEM
L. F. Brady May 1974 29 p
(Contract AT(29-1)-789)
(SLA-74-185) Avail: NTIS HC $3.75

Data obtained from tests of eighteen seismometer/amplifier systems conducted on a shake table facility are presented. Included are descriptions of the seismometer and amplifier and of the system test procedures. The test results are summarized. Illustrations and drawings of the equipment are provided. Author

N75-13230# United Kingdom Atomic Energy Authority, Culham (England).
GENERAL PURPOSE CONTINUOUS OBSERVATION INFRA-RED VIEWER
S. A. Hamadto Jan. 1974 17 p refs
(CLM-R-129) Avail: AEC Depository Libraries HC $4.00; UK £1; BIS $4.05

A general purpose, cholesteric liquid crystal infra-red viewer has been constructed. The device, which is portable, cheap and simple to make and operate, has interchangeable screens and temperature bias facilities. It can detect power levels from a few tens of milliwatts to a few watts per sq cm. It affords a very convenient means for qualitative infra-red viewing, e.g., visualization of laser modes and interference patterns including Fabry-Perot fringes, optical alignment and determination of lens focal lengths at the infra-red. Author (NASA)

N75-13231# California Univ., Livermore. Lawrence Livermore Lab.
INVESTIGATION OF A NEW COLOR FILM FOR WATER PENETRATION PHOTOGRAPHY

W. C. Herrmann 2 Apr. 1974 15 p refs
(Contract W-7405-eng-48)
(UCID-16502) Avail: NTIS HC $3.25

A two-emulsion color film designed for aerial photography of underwater objects was developed. The film incorporates peak sensitivities for each emulsion layer plus improved resolution and higher gamma. Improved visual discrimination results from the complementary colors of the two layers. Eliminating the red-sensitive layer helps make this emulsion superior to standard color films in recording the maximum underwater detail. The results of performance tests of the film are summarized. The development procedure is discussed. Author

N75-13232# Iowa Inst. of Hydraulic Research, Iowa City.
AN INVESTIGATION OF A REMOTE TRANSIENT HEAT FLUX SENSOR. PART 2: ERROR ANALYSIS Final Report, 1 Jan. - 15 Aug. 1974
Ching Jen Chen and Truong Minh Danh Aug. 1974 94 p refs
(Grant DAHC04-74-G-0090)
(AD-784204; IIHR-E-CJC-74-74-002; AROD-12284-1-RT) Avail: NTIS CSCL 14/2

The second part of the report is error analysis of a remote heat flux sensor. The Chromel Alumel thermocouple measurement in a finite rectangular slab exposed to a constant heat flux is analyzed for error due to distortion of temperature by cavities drilled. In the experiment three test pieces 1 in., 3/4 in., and 1/2 in. thick of steel plates initially at the room temperature are exposed to a heat flux of 1700 Btu/ft sq. hr. Errors in the response of temperature due to disturbance by the cavities of 1/16 in., 1/8 in., 1/4 in., and 1/2 in. hole diameter at four different depths are determined. It is found that error ranging 8 to 18% is more sensitive to the hole diameter than the variation in depth between 20 to 80% of the plate thickness. Guideline for correction of the temperature response measured by an intrinsic thermocouple is then established before the inversion of the data for prediction of the transient surface and heat flux is made. Author (GRA)

N75-13233# Naval Ordnance Lab., White Oak, Md.
AN ELECTRONIC INTEGRATOR FOR TRANSIENT SHOCK SIGNATURES
Luigi A. Vagnoni 14 Mar. 1974 19 p refs
(AD-779859/8; NOLTR-74-54) Avail: NTIS HC $3.25 CSCL 14/2

The report describes an electronic integrator developed for use in obtaining velocity-time signatures from transient shock signatures. The integrator consists of three assemblies: an integrator circuit, a square wave calibrator, and a triggered relay control circuit. Both real time and magnetically taped data can be accommodated. The output is scaled to convert the input in units of acceleration in g to provide an output in units of velocity in feet per second. A brief background discussion and typical operational procedures are presented. Author (GRA)

N75-13234# British Steel Corp., Sheffield (England). Information Services.
TORQUE TELEMETER
A. Shutt, J. M. Halford, and D. Maycock Jun. 1974 9 p
(PB-234299/6; GS/TECH/292/1/73/C) Avail: NTIS HC $3.25 CSCL 09F

The operation of a torque telemeter system and a detailed account given of its individual components, together with setting up and operating instructions. Operating experience is briefly described. GRA

N75-13235# Army Foreign Science and Technology Center, Charlottesville, Va.
THEORY OF WIDE ANGLE PHOTOGRAPHIC PROCESSING
G. B. Gonin Feb. 1974 29 p refs Transl. into ENGLISH from unidentified Russian document, Leningrad, 1967 p 121-135
(AD-785936; FSTC-HT-23-1287-73) Avail: NTIS CSCL 08/2

The article deals with the development of a general theory for the processing and interpretation of the kind of wide-angle (panoramic) photographs which might be taken by a stationary camera system on the surface of a celestial body. The overall distinguishing feature of the photogrammetric method considered is a transition to equivalent planar pictures of central projection. GRA

N75-13236# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
MAGNUS MEASUREMENTS WITH THE MAGNETIC BALANCE SYSTEM Final Technical Report, 6 Mar. 1972 - 30 Dec. 1973
Charles W. Haldeman, James B. Coffins, Edwin P. Birtwell, and Milan Vlajinac May 1974 57 p refs
(Contract DAAD05-72-C-0181)
(AD-782753; BRL-CR-153) Avail: NTIS CSCL 14/2

Recent wind tunnel tests in the magnetic balance system at the M.I.T. Aerophysics Laboratory are described. Improvements in the balance, which holds wind tunnel models magnetically without physical supports, were required in order to obtain measurements of the aerodynamic Magnus side force on spinning bodies of revolution at angles of attack up to 10 degrees and spinning ring airfoils at angles of attack up to 3.5 degrees. Improvements described include a laser position system with an angular holding capability of .02 degrees, a data acquisition system, and model construction techniques using copper-iron composite structures. Typical aerodynamic data is presented for a 5:1 ogive cylinder at M = .27 to .43. Magnetically obtained Magnus side force data is presented which exhibits a scatter of less than 0.005 in side force coefficient. Data is also presented, which shows that in this Reynolds number range the effect of a sting can be large. (Modified author abstract) GRA

N75-13444* Linguistic Systems, Inc., Cambridge, Mass.
THE PROBLEM OF SELECTING AN OPTIMUM FREQUENCY FOR A MEASURING GENERATOR IN DETERMINING THE VALUE OF THE HYDROPHYSICAL PARAMETER WITH A GIVEN ACCURACY
V. A. Stepanyuk *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 80-84 ref Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 65-67 (For availability see N75-13438 04-46)
CSCL 14B

N75-13723* Scripta Publishing Corp., Washington, D.C.
APPARATUS FOR CALIBRATION OF ON-BOARD INSTRUMENTS AND LABORATORY MODELLING OF RAREFIED PLASMA FLOWS PAST MODELS
Ye. N. Yevlanov, V. B. Leonas, and S. V. Umanskiy *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 282-291 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 202-209 (For availability see N75-13707 04-90)
CSCL 14B

36 LASERS AND MASERS

Includes parametric amplifiers.

N75-13237 Rice Univ., Houston, Tex.
CONTINUOUS WAVE DYE LASERS AND THEIR APPLICATIONS TO HIGH RESOLUTION SPECTROSCOPY Ph.D. Thesis
John Paul Hohimer 1974 187 p
Avail: Univ. Microfilms Order No. 74-21281

The 3-mirror astigmatically compensated continuous wave (CW) dye laser was the basis for a pressure-tuned CW dye laser for spectroscopic applications. Traveling-wave operation of this laser was achieved using a passive optical isolator. By using air-spaced etalons enclosed in an intracavity pressure chamber, this single mode dye laser can be tuned over ranges greater than one nanometer. A frequency marker consisting of a fixed-frequency laser and a synchronously pressure-tuned Fabry-Perot cavity provides the calibration of the absorption

spectrum. The photon statistics of the CW dye laser were studied. The photocount statistics and photocount correlations of a dye laser operated with and without internal etalons were determined. Estimates of the mean laser light intensity as a function of time were made using the photocount records and a newly developed stochastic estimation procedure. Dissert. Abstr.

N75-13238 Rochester Univ., N.Y.
HIGH RESOLUTION SPECTROSCOPY USING A CW STABILIZED DYE LASER Ph.D. Thesis
Felix Joseph Schuda 1974 190 p
Avail: Univ. Microfilms Order No. 74-22627

The construction of a stabilized continuous wave (CW) dye laser and its use with a sodium atomic beam to gain information about the range of validity of certain atomic radiation theories are discussed. By lengthening the laser cavity, cooling the dye solution, and adding other refinements, the bandwidth of a single mode CW dye laser was reduced to 3 MHz over a period of ten seconds. By the insertion of three uncoated glass etalons, single mode tunable operation was achieved. The dye laser was stabilized in order to perform experiments on the hyperfine structure of sodium at high enough resolution and intensity to see any possible differences in the theoretical predictions of quantum electrodynamics, the optical Bloch equations, and neoclassical radiation theory. Two types of experiments were carried out: those studying the absorption spectrum and those studying the emission spectrum. The dynamic Stark effect is observed near resonance in the optical region. A number of optical pumping phenomena are also noted. Dissert. Abstr.

N75-13239 Stanford Univ., Calif.
VIBRATIONAL NONEQUILIBRIUM IN CARBON DIOXIDE ELECTRIC DISCHARGE LASERS Ph.D. Thesis
Edward Ray Murray, Jr. 1974 148 p
Avail: Univ. Microfilms Order No. 74-20214

An experimental and theoretical investigation of the vibrational nonequilibrium in a CO2-N2-He electric discharge was performed under strong nonequilibrium conditions. A tuneable, spectrally pure CO2 laser was constructed and used with a double-beam diagnostic system to measure small signal 10.6 and 9.6 micron gain in an electric discharge laser amplifier tube. Vibrational temperatures of the symmetric and bending modes were determined by combining the gain measurements with a direct measurement of the vibrational temperature of the asymmetric mode using a band reversal. A theoretical analysis was formulated using all significant collisional and radiative processes. Transfer rates for all of these processes have been previously established to within a factor of 2, with the exception of the symmetric-bending mode coupling rate which has an experimental discrepancy of a factor of 400. This coupling rate was used as the only adjustable parameter in the theory to match the theoretically predicted 10.6 and 9.6 micron gains to experimental values. Dissert. Abstr.

N75-13240 Catholic Univ. of America, Washington, D.C.
VIBRATIONAL ENERGY TRANSFER PROCESSES IN GASEOUS MIXTURES INVESTIGATED BY THE LASER INDUCED VIBRATIONAL FLUORESCENCE TECHNIQUE Ph.D. Thesis
Barbara Mary Hopkins 1974 114 p
Avail: Univ. Microfilms Order No. 74-19469

The laser induced vibrational fluorescence technique was used to measure cross sections of vibration to vibration energy transfer processes and of vibration to translation and/or rotation energy transfer processes. Hydrogen chloride or hydrogen bromide molecules in gaseous mixtures were excited to their first vibrational state by absorption of a pulse from HCl or HBr chemical lasers. Near resonant energy transfer from the hydrogen halide molecule to other molecules present in the mixtures excited these collision partners to their first vibrationally excited state. The IR fluorescence given off as the mixtures decayed to the ground state was observed and the measured decay rates were related to the kinetics of the mixtures. From these relationships vibrational relaxation rates were calculated. Dissert. Abstr.

N75-13241*# Oregon State Univ., Corvallis.
A LIDAR SYSTEM FOR REMOTE PROBING OF THE LOWER ATMOSPHERE
Charles D. Craig, Robert Bartz, Lars E. Olsson, and E. Wendell Hewson Nov. 1974 53 p refs
(Grant NGR-30-002-048)
(NASA-CR-141013) Avail: NTIS HC $4.25 CSCL 17I

The development and characteristics of a lidar system for atmospheric measurements are discussed. The lidar system employs a Q-switched ruby laser that radiates an intense pulse of light into the atmosphere to illuminate aerosol particles in the laser beam. Light backscattered from the particles is received by a Cassegrain telescope equipped with a sensitive photomultiplier tube. The output signal of the photomultiplier tube is displayed on an oscilloscope and recorded on polaroid film. Author

N75-13242*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
AN EVALUATION OF SAO SITES FOR LASER OPERATIONS
J. M. Thorp, M. A. Bush, and M. R. Pearlman Oct. 1974 46 p refs
(Grant NGR-09-015-002)
(NASA-CR-141010; RTOP-161-01-03) Avail: NTIS HC $3.75 CSCL 17I

Operational criteria are provided for the selection of laser tracking sites for the Earth and Ocean Physics Applications Program. A compilation of data is given concerning the effect of weather conditions on laser and Baker-Nunn camera operations. These data have been gathered from the Smithsonian astrophysical observing station sites occupied since the inception of the satellite tracking program. Also given is a brief description of each site, including its characteristic weather conditions, comments on communications and logistics, and a summary of the terms of agreement under which the station is or was operated. Author

N75-13243*# National Aeronautics and Space Administration. Pasadena Office, Calif.
FIBER DISTRIBUTED FEEDBACK LASER Patent Application
Charles Elachi (JPL), Gary A. Evans (JPL), and Cavour Yeh, inventors (to NASA) (JPL) Filed 11 Dec. 1974 17 p
(Contract NAS7-100)
(NASA-Case-NPO-13531-1; US-Patent-Appl-SN-531565) Avail: NTIS HC $3.25 CSCL 20E

Optical fiber lasers utilizing distributed feedback are examined for use as communication channels in optical communication networks. A laser is made of an integral part of the optical fiber channel by either diffusing active material into the optical fiber or surrounding the optical fiber with the active material. Oscillation within the active medium to produce lasing action is established by grating the optical fiber so that distributed feedback occurs. NASA

N75-13244# California Univ., Berkeley. Lawrence Berkeley Lab.
STATUS OF ARPA-LLL4-D PROPAGATION CODE DEVELOPMENT
J. A. Fleck, Jr. 22 May 1974 110 p
(Contract W-7405-eng-48)
(UCID-16524) Avail: NTIS HC $5.25

A four-dimensional description of atmospheric laser propagation is presented for three regimes of interest, each of which requires a fundamentally different approach. These are: (1) quasi-CW pulse propagation in the presence of stagnation or dead zones but without supersonic slewing, (2) long pulse propagation with supersonic slewing, and (3) multipulse propagation. A code applicable to all three of these categories is now complete and is ready for general use. Additions to the code are needed for specific scenario applications. Author

N75-13245# California Univ., Livermore. Lawrence Livermore Lab.
STUDIES OF LASER CALORIMETERS USING GLASS ABSORBERS AND BLACK PAINTED ABSORBERS FROM 0.46 TO 1.06 MICRONS
S. R. Gunn 10 Jul. 1974 9 p refs
(Contract W-7405-eng-48)
(UCRL-51613) Avail: NTIS HC $3.25

Studies of calorimeters with black-painted absorbers and various glass absorbers at several laser frequencies from

457.9 to 1064 nm, CW, and at 694 nm, pulsed, are described. Reflectances of the absorbers were studied using a previously described reflectance calorimeter, and some transmittances of the glasses were measured. One of the calorimeters was compared with a previously described tubular calorimeter, and another with a reference calorimeter at the National Bureau of Standards.
Author (NSA)

N75-13246# California Univ., Livermore. Lawrence Livermore Lab.
NONLINEAR PROPAGATION STUDIES
E. S. Bliss 3 Jun. 1974 19 p refs Presented at ASTM Workshop, Boulder, Colo., 22-23 May 1974 Sponsored by AEC
(UCRL-75752; Conf-740524-4) Avail: NTIS HC $3.25

The desire to avoid damaging the components of high-power solid-state laser-systems being built for laser fusion experiments has led to increased interest in all aspects of intense pulse propagation. A variety of observations of nonlinear propagation phenomena and the instrumentation used for measuring them are described. Comparisons with theoretical predictions are presented, and some approaches to minimization of the resulting problems in large systems are outlined. The intent is to present an up-to-date summary of the progress being made in characterizing and controlling nonlinear propagation effects. Author (NSA)

N75-13247# California Univ., Livermore. Lawrence Livermore Lab.
X-RAY LASERS: NECESSARY CONDITIONS
S. Slutz, G. Zimmerman, and W. Lokke 26 Oct. 1973 14 p refs Presented at the Ann. Plasma Phys. Meeting of the Am. Phys. Soc., Philadelphia, 31 Oct. 1973 Sponsored by AEC
(UCRL-74959; Conf-731009-12) Avail: NTIS HC $3.25

Necessary conditions are given for the attainment of X-ray laser action, primarily for use by those attempting to design, conduct, and analyze X-ray laser experiments. These conditions are believed to be an essentially self evident necessity for the restricted set of circumstances treated: cylinders of potentially X-ray lasing media of large aspect ratio without an external optical cavity. Only lasers operating on bound-bound transitions, whose practical feasibility is relative to those coupling free-free or free-bound transitions, whose given widths are effectively very broad, and whose peak gains are relatively very small are treated. Author (NSA)

N75-13248# California Univ., Livermore. Lawrence Livermore Lab.
ISOTOPE SEPARATION BY LASER RADIATION PRESSURE DEFLECTION OF AN ATOMIC BEAM
A. F. Bernhardt, D. Duerre, J. Simpson, L. L. Wood, J. Goldsborough, and C. Jones 7 Jun. 1974 8 p Presented at the 8th Intern. Quantum Electron. Conf., San Francisco, 10-13 Jun. 1974 Sponsored by AEC
(UCRL-75545-Rev-1; Conf-740617-7) Avail: NTIS HC $3.25

The results of a barium isotope separation experiment in which a single isotopic component of an atomic beam was selectively deflected by resonant scattering of laser light are presented. NSA

N75-13249# Los Alamos Scientific Lab., N.Mex.
LASER-ENHANCED CHEMICAL REACTIONS AND THE LIQUID STATE: AN INTRODUCTION
C. K. Rofer-DePoorter and G. L. DePoorter Jun. 1974 18 p refs
(Contract W-7405-eng-36)
(LA-5630-MS) Avail: NTIS HC $3.25

Laser enhancement of chemical reactions has mostly been studied in the gaseous state, but cannot be ruled out for the liquid state. Enhancement of reactions taking place in the liquid state could have important economic consequences for many industrial chemical processes. Physical and chemical principles involved in enhancement of chemical reactions are reviewed, and relevant literature is discussed. Author (NSA)

N75-13250# Los Alamos Scientific Lab., N.Mex.
APPROXIMATE SPHERICAL BLAST THEORY AND LASER-INITIATED PELLET MICROEXPLOSIONS
D. A. Freiwald Jun. 1974 5 p refs
(Contract W-7405-eng-36)
(LA-5641-MS) Avail: NTIS HC $3.25

Equations are presented which describe the shock speed and overpressure as a function of radius for strong spherical blasts in cases where the source mass is not negligible. Approximations similar to those used in the Taylor-Sedov approximate theory are employed. Sample calculations are presented for a laser-initiated 1-MJ (debris energy) pellet microexplosion and compared to Taylor-Sedov approximate theory solutions. Author

N75-13251# California Univ., Livermore. Lawrence Livermore Lab.
CALCULATED INTENSITY THRESHOLD FOR THE MAINTENANCE OF LASER-SUPPORTED DETONATION WAVES WITH VARIOUS ELECTRON DENSITIES
N. M. Ferriter and A. M. Winslow 10 Jun. 1974 15 p refs
(Contract W-7405-eng-48)
(UCRL-51606) Avail: NTIS HC $3.25

The characteristics of laser absorption waves in gases which are ignited at a solid target and move up the laser beam at high velocities with decoupling of the laser energy from the target, are discussed. For laser intensities greater than a certain threshold, these waves propagate by shock ionization and are called laser supported detonation (LSD) waves. A one dimensional intensity threshold for the maintenance of the LSD waves is calculated based on the free electron density at the Chapman-Jouguet point. Thresholds are calculated in air as a function of density. For a given wavelength, a maximum height is found above which LSD waves cannot be maintained. Author

N75-13252# California Univ., Livermore. Lawrence Livermore Lab.
PHYSICS OF LASER-IGNITED PELLETS: IMPLOSION HYDRODYNAMICS OF FERMI GASES AND CENTRAL THERMONUCLEAR BURN INITIATION
L. Wood and J. Nuckolls 30 Oct. 1973 11 p Presented at the Ann. Plasma Phys. Meeting of the Am. Phys. Soc., Philadelphia, 31 Oct. 1973 Sponsored by AEC
(UCRL-74937; Conf-731009-11) Avail: NTIS HC $3.25

The basic physical processes operative in the laser-energized implosion and central ignition of fusion fuel pellets are considered with emphasis on those aspects which determine the energy efficiency of laser-induced thermonuclear microexplosion. The energy efficiency of laser-energized matter compression which is subject to generalization to the required degree is derived. Author (NSA)

N75-13253# Los Alamos Scientific Lab., N.Mex.
ABLATION STABILITY OF LASER-DRIVEN IMPLOSIONS
D. B. Henderson, R. L. McCrory, and R. L. Morse Jun. 1974 5 p refs
(Contract W-7405-eng-36)
(LA-5604-MS) Avail: NTIS HC $3.25

The perturbation analysis of laser-driven implosions was examined showing the positive stability of the ablation surface. The opposite conclusion has been reported by othersj Numerical results are reported from a more complete class of problems. The conclusions are supported by general physical arguments.
Author (NSA)

N75-13254# Los Alamos Scientific Lab., N.Mex.
CALCULATIONS OF LASER INDUCED SPALL IN ALUMINUM TARGETS
A. R. Larson May 1974 38 p refs
(Contract W-7405-eng-36)
(LA-5619-MS) Avail: NTIS HC $3.75

One-dimensional, plane geometry calculations of material response to laser-target interaction are presented. The targets are homogeneous slabs of aluminum. Calculations were conducted for targets in a vacuum and in air. Parameters that were varied include laser-light wavelength, duration of constant-power pulses, target material thickness, and laser energy absorbed by the target. Laser energy was varied to identify thresholds at which spall occurs. As laser pulse times approach the value of two shock transit times, the results reveal: (1) that a large increase in energy is required for spall, and (2) that the thickness of the spalled layer increased greatly. Author

N75-13255# Naval Intelligence Support Center, Washington, D.C. Translation Div.
[RESEARCH ON TRAVELING WAVE AMPLIFIERS AND TWO FREQUENCY AND COMMERCIAL GAS LASERS]
Yr. A. Gorokhov, Yu. A. Nestrizhenko, and V. I. Dolotko 6 Mar. 1974 18 p refs Transl. into ENGLISH from Pribory i Tekhn. Eksperim. (Moscow), no. 4, 1974 p 207-213
(AD-778386; NSIC-Trans-3519) Avail: NTIS CSCL 20/5

A traveling wave amplifier with a gas mixture of He, N2, and CO2 is discussed along with a laser containing ruby and neodymium glass in a common resonator. The results of an experimental study of the spatial coherence of commercial gas lasers are reported. F.O.S.

N75-13256# United Aircraft Corp., East Hartford, Conn. Research Labs.
HIGH POWER DYE LASERS Semiannual Report, 1 Mar. - 30 Sep. 1974
W. W. Murey and W. H. Glenn 30 Sep. 1974 54 p refs
(Contract N00014-73-C-0284; ARPA Order 1806)
(AD-786232; UARL-N921617-8; SAR-8) Avail: NTIS CSCL 20/5

The report describes modifications made to the previously reported high power dye laser to allow for increased power handling capability, repetition rate and operating times. Present problems are primarily involved with dye circulation and heat dissipation and the solution to these should lead to power output from the dye laser that are well in excess of the presently available level of 41 watts. Sections cover the following: Design and testing of new flashlamps; Theory of power distribution in flashlamp; Rotary spark gap; Ray tracing program; and Dye flow system and laser power measurements. GRA

N75-13257# ILC Technology, Inc., Sunnyvale, Calif.
PRODUCTION ENGINEERING MEASURE FOR OPTICAL PUMPS FOR LASERS Quarterly Report, Oct. - Dec. 1973
Hal Sowers and Robert Maynard 1 Feb. 1974 30 p ref
(Contract DAAB05-73-C-2078)
(AD-785596; R-ILC-73-22/Q2; QR-2) Avail: NTIS CSCL 20/5

This program is directed towards establishing a capability for the manufacture of flashlamps to be used as optical pumps in laser systems. Work has been directed towards the evaluation and establishment of a series of lamps to be used as secondary standards throughout the program. A matrix of probably near-optimal variations covering the design of compressed gas cooled lamps with a 2.050 inch arc length was developed and first samples fabricated. The evaluation of liquid cooled lamps has continued. The government furnished property was received and is being tested. Modifications have been completed to the special test equipment supplied by ILC, which includes a precision power supply, water cooled laser and fluorescent analysis instrument, and four channel data acquisition system. (Modified author abstract) GRA

N75-13258# General Electric Co., Philadelphia, Pa. Space Div.
INVESTIGATION OF HIGH POWER MHD GAS LASERS Semiannual Report, Jan. - Aug. 1974
Bert Zauderer, Eric Tate, and C. H. Marston Aug. 1974 32 p ref
(Contract N00014-74-C-0243)
(AD-785911) Avail: NTIS CSCL 20/5

This report presents the results obtained during the first half of the year 1974 in the study of MHD powered gas lasers. Key results of the work thus far are: Changes to the shock tunnel and test facility include a modified cesium seed injection system, relocation of the secondary diaphragm, installation of a primary double diaphragm and a new CO2 probe laser. Gain measurements previously reported have been repeated, with substantial improvement in the signal attributable to the above changes. Achievement of 19% enthalpy extraction in the MHD generator channel is an important step forward in generator performance. Author (GRA)

N75-13259# General Electric Co., Philadelphia, Pa. Re-Entry and Environmental Systems Div.
RAM AIRBREATHING LASER Final Report, 15 May - 15 Oct. 1973
M. J. Brunner May 1974 90 p refs
(Contract F33615-73-C-4149; AF Proj. 7065)
(AD-783218; Doc-73SD2161; ARL-74-0036) Avail: NTIS CSCL 20/5

The performance characteristics of a ram airbreathing laser (RAL) were investigated for a wide range of Mach numbers (3 to 6) and altitudes (40 to 100 Kft). The supersonic inlet, based on pressure recovery data, provided pressures between 2 and 55 atm and temperatures between 600 and 1700K at the combustor inlet. Benzene was used as fuel to raise the gas temperature. The population inversion, the small signal gain and maximum available laser energy were determined as functions of axial position for the nonequilibrium flow through the special nozzle and laser cavity section for the unique RAL CO2-N2-H2O-O2 gas mixture for the current vibrational relaxation rates. The mole fraction of each constituent in the gas mixture was evaluated as a function of the combustor inlet conditions, fuel and fuel-air ratio. The laser performance characteristics were established for a wide variety of pressures, temperatures and nozzle characteristics. The pressure, temperature, nozzle area ratio and throat height for maximum laser performance were identified. The laser power increases with decreasing altitude and increasing Mach Number. The laser cavity and ram inlet geometries have been evaluated as functions of Mach number. (Modified author abstract) GRA

N75-13260# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
QUANTIZATION OF SCATTERING OF LASER BEAMS. WINDOW AND ATMOSPHERIC SCATTERING AT 1.06 MICROMETERS Final Report, 5 Jun. - 4 Oct. 1973
Dwayne C. Carmer and George H. Lindquist Oct. 1973 165 p refs
(Contract DAAH01-73-C-0933)
(AD-783431; ERIM-104100-2-F) Avail: NTIS CSCL 20/6

A laser beam propagating through the atmosphere from a transmitter can be observed at various aspect angles because of scattering by the exit window of the transmitter and by particles in the atmosphere. The objective of this contract was to provide quantitative values for both types of scattering at the 1.06 micrometer laser wavelength. The contractual effort was conveniently divided into two tasks: Task (1) measure the laser beam scattering for a set of five different window materials under these conditions: clean, or dirty with small amounts of water, dust, and fingerprints (oil), or cleaned, as would be done by a laser operator in the field; Task (2) - calculate the laser beam scattering for a standard clear and a standard hazy atmosphere as functions of polarization and receiver position for receiver fields of view of 300, 100, 30, and 1 mr. Procedures used are discussed, the results of the measurements and calculations are given in graphic form and a brief comparison of window and atmospheric scattering is presented along with conclusions and recommendations. GRA

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N75-13261* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
METHOD OF PROTECTING THE SURFACE OF A SUBSTRATE Patent
Michael A. Gedwill, inventor (to NASA) and Salvatore J. Grisaffe Issued 26 Nov. 1974 5 p Filed 16 Oct. 1972 Supersedes N73-10502 (11 - 01, p 0061)
(NASA-Case-LEW-11696-1; US-Patent-3,849,865; US-Patent-Appl-SN-298156; US-Patent-Class-29-460; US-Patent-Class-29-196.6; US-Patent-Class-29-197; US-Patent-Class-29-494; US-Patent-Class-29-497.5; US-Patent-Class-29-504) Avail: US Patent Office CSCL 13H

The surface of a metallic base system is initially coated with a metallic alloy layer that is ductile and oxidation resistant. An aluminide coating is then applied to the metallic alloy layer. The chemistry of the metallic alloy layer is such that the oxidation

resistance of the subsequently aluminized outermost layer is not seriously degraded. Official Gazette of the U.S. Patent Office

N75-13262 Wisconsin Univ., Madison.
COMPUTER DESIGN OF THE UNEQUAL BLADE SPACING OF A FACE MILLING CUTTER TO MINIMIZE FORCED VIBRATION Ph.D. Thesis
Patrick Doolan 1974 143 p
Avail: Univ. Microfilms Order No. 74-18929

The relative vibration between the cutter and workpiece in the face milling process is given by the product of the amplitude spectrum of the excitation force. A computer algorithm, consisting of nonlinear least squares to locate a local minimum and a random search to account for multimodality, is developed to choose the blade spacing such that the total vibration is minimized. An instantaneous impact of constant amplitude is used as a simple force model to minimize the amount of information required to design the cutter. The case of both a known and unknown system response is considered. Two cutters having unequal blade spacing chosen by the method developed are compared to identical cutters having equal blade spacing. The results show a reduction in resonant vibration level and a dispersion of vibrational energy over a broad frequency range for the cutters with unequal blade spacing. Both acoustical and mechanical vibrations were investigated. Dissert. Abstr.

N75-13263 Rensselaer Polytechnic Inst., Troy, N.Y.
NUMERICAL SOLUTIONS FOR VARIOUS LUBRICATION FLOWS INCLUDING CONVECTIVE INERTIAL EFFECTS Ph.D. Thesis
Mein-Kai Ho 1974 222 p
Avail: Univ. Microfilms Order No. 74-26078

Numerical solutions for various flow problems related to flow crossing a bearing feeding groove and entering the lubrication film of a bearing pad are analyzed. Inertial terms are retained in the equations of motion and both laminar and turbulent flow are considered. The objective of the research is to provide solutions for the pressure levels obtained at the entrance to bearing pads as a function of the flow fields approaching the bearing pad and those obtained within the bearing film. Under conditions where bearing film Reynolds numbers are high (approximately 10,000), these entrance pressure levels can become significant compared with the maximum pressures within the bearing film. Dissert. Abstr.

N75-13264 Rensselaer Polytechnic Inst., Troy, N.Y.
AN INVESTIGATION OF THE EFFECTS OF AGING ON STRESS RELAXATION AND STRAIN-AGE CRACKING IN RENE 41 WELDMENTS Ph.D. Thesis
Joseph E. Franklin 1974 176 p
Avail: Univ. Microfilms Order No. 74-26073

Hardness measurements on weldments and simulated heat-affected zone specimens coupled with transmission electron microscopy studies showed that gamma prime dissolution and reprecipitation occur in the heat-affected zone during welding. In addition, M6C carbides in solution annealed Rene 41 and M23C6 carbides in overaged Rene 41 are dissolved in the heat-affected zone during welding. Stress relaxation experiments showed that aging contraction results in the generation of stress in solution annealed Rene 41 base metal. Aging contraction occurs in the heat-affected zone of both solution annealed and overaged Rene 41 and results in sustained high residual stress levels in these regions. Aging contraction did not occur in overaged base metal, and rapid stress relaxation occurred in this material. Dissert. Abstr.

N75-13265* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
VARIABLE RESISTANCE CONSTANT TENSION AND LUBRICATION DEVICE Patent
Henry J. Smith, inventor (to NASA) (Boeing Co., Cocoa Beach, Fla.) Issued 10 Dec. 1974 7 p Filed 4 Apr. 1973 Supersedes N73-23553 (11 - 14, p1670) Sponsored by NASA
(NASA-Case-KSC-10723-1; US-Patent-3,854,113; US-Patent-Appl-SN-347952; US-Patent-Class-338-75; US-Patent-Class-338-97; US-Patent-Class-338-162) Avail: US Patent Office CSCL 13I

A variable resistance device is described which includes a cylindrical housing having elongated resistance wires. A movable arm having a supporting block carried on the outer end is rotatably carried by the cylindrical housing. An arcuate steel spring member is pivotally supported by the movable arm. A leather wiper member is carried adjacent to one end of the spring steel member, and an electrically conductive surface is carried adjacent to the other end. The supporting block maintains the spring steel member in compression so that a constant pressure is applied to the conductive end of the spring steel member and the leather wiper. The leather wiper is saturated with a lubricating oil for maintaining the resistance wire clean as the movable arm is manipulated. Official Gazette of the U.S. Patent Office

N75-13266* National Aeronautics and Space Administration. Pasadena Office, Calif.
GENEVA MECHANISM Patent Application
Robert H. Summers (JPL) and Ralph L. Kenney, inventors (to NASA) (JPL) Filed 24 Dec. 1974 5 p Filed 2 Nov. 1973 Supersedes N74-23071 Sponsored by NASA
(NASA-Case-NPO-13281-1; US-Patent-3,855,873; US-Patent-Appl-SN-412079; US-Patent-Class-74-436; US-Patent-Class-74-820) Avail: US Patent Office (12 - 14, p 1679) CSCL 13I

An improved Geneva mechanism is characterized by a driven star-wheel having a segmented cam-follower surface. Star-wheel driver includes a restraining cam having a segmented cam surface for engaging the cam-follower surface of the star-wheel and antifriction rollers pinned to the restraining cam for engaging the cam-follower surface. Official Gazette of the U.S. Patent Office

N75-13267*# National Aeronautics and Space Administration, Washington, D.C.
ELECTRICAL HAND TOOLS AND TECHNIQUES: A COMPILATION Technology Utilization
[1974] 28 p
(NASA-SP-5916(03)) Avail: NTIS HC $1.00 CSCL 13I

Space technology utilization for developing tools, adapters, and fixtures and procedures for assembling, installing, and servicing electrical components and equipment are discussed. Some of the items considered are: (1) pivotal screwdriver, (2) termination locator tool for shielded cables, (3) solder application tools, (4) insulation and shield removing tool, and (5) torque wrench adapter for cable connector engaging ring. Diagrams of the various tools and devices are provided. Author

N75-13268*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SERVO VALVE Patent Application
Howell D. Garner, inventor (to NASA) Filed 11 Dec. 1974 11 p
(NASA-Case-LAR-11643-1; US-Patent-Appl-SN-531649) Avail: NTIS HC $3.25 CSCL 13K

The development and characteristics of a servo valve for controlling the flow of gaseous or hydraulic fluids to servo motors are discussed. A venturi-shaped arrangement is used in which the pressure change to the servo is as great as twice the supply pressure. There is a linear relation between the position of the flapper valves relative to the end of the first conduit and the pressure applied to the servo. Diagrams of the device are provided. NASA

N75-13269*# Pratt and Whitney Aircraft, East Hartford, Conn. Materials Engineering and Research Lab.
COATINGS FOR DIRECTIONAL EUTECTICS Final Report, 30 Mar. 1973 - 30 Jun. 1974
E. J. Felten, T. E. Strangman, and N. E. Ulion Oct. 1974 157 p refs
(Contract NAS3-16792)
(NASA-CR-134735; PWA-5091) Avail: NTIS HC $6.25 CSCL 11C

Eleven coating systems based on MCrAlY overlay and diffusion aluminide prototypes were evaluated to determine their capability for protecting the gamma/gamma prime-delta directionally solidified eutectic alloy (Ni-20Cb-6Cr-2.5Al) in gas turbine engine applications. Furnace oxidation and hot corrosion, Mach 0.37 burner-rig, tensile ductility, stress-rupture and thermomechanical fatigue tests were used to evaluate the coated

gamma/gamma prime-delta alloy. The diffusion aluminide coatings provided adequate oxidation resistance at 1144 K (1600 F) but offered very limited protection in 114 K (1600 F) hot corrosion and 1366 K (2000 F) oxidation tests. A platinum modified NiCrAlY overlay coating exhibited excellent performance in oxidation testing and had no adverse effects upon the eutectic alloy. Author

N75-13270*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
STATOR HUB TREATMENT STUDY Final Report, Jun. 1973 - Dec. 1974
D. C. Wisler and D. E. Hilvers Dec. 1974 95 p refs
(Contract NAS3-17359)
(NASA-CR-134729; R74AEG410) Avail: NTIS HC $4.75 CSCL 21E

The results of an experimental research program to investigate the potential of improving compressor stall margin by the application of hub treatment are presented. Extensive tuft probing showed that the two-stage, 0.5 radius ratio compressor selected for the test was indeed hub critical. Circumferential groove and baffled wide blade angle slot hub treatments under the stators were tested. Performance measurements were made with total and static pressure probes, wall static pressure taps, flow angle measuring instrumentation and hot film anemometers. Stator hub treatment was not found to be effective in improving compressor stall margin by delaying the point of onset of rotating stall or in modifying compressor performance for any of the configurations tested. Extensive regions of separated flow were observed on the suction surface of the stators near the hub. However, the treatment did not delay the point where flow separation in the stator hub region becomes apparent. Author

N75-13271*# Scientific Translation Service, Santa Barbara, Calif.
DIFFUSION IN SOLID BODIES, TAKING DIFFUSION WELDING INTO CONSIDERATION
S. Rasche Washington NASA Dec. 1974 38 p refs Transl. into ENGLISH from VDI Z. (West Germany), v. 116, no 7, May 1974 p 546-554
(Contract NASw-2483)
(NASA-TT-F-16059) Avail: NTIS HC $3.75 CSCL 13H

The theoretical principles of diffusion are examined, giving attention to the derivation of the diffusion equation, its solution, the examination of the diffusion coefficient, the temperature dependence of the diffusion coefficient, and the determination of the concentration-dependent diffusion coefficient. Aspects of up-hill diffusion are considered along with the Kirkendall effect and processes involving the presence of various phases. A number of special problems connected with diffusion welding are discussed. The parameters which have to be taken into account in this process include pressure, temperature, welding time, protective atmosphere, and surface roughness. Suitable welding conditions for a number of metal combinations are presented in a table. Author

N75-13272*# Kanner (Leo) Associates, Redwood City, Calif.
METHODS OF NONSTATIONARY MEASUREMENT IN TURBINES
R. Larguier and A. DeSievers Washington NASA Dec. 1974 33 p refs Transl. into ENGLISH from the French report
(Contract NASw-2481)
(NASA-TT-F-16082) Avail: NTIS HC $3.75 CSCL 21E

The flow within an aircraft turbine contains numerous random and periodic disturbances which can lead to performance losses, produce structural vibrations and generate noise. Techniques used to measure transient parameters in subsonic and supersonic flows through aircraft turbines are described. Measurements of wall pressure distributions on rotor blades and in the inlet chamber upstream from the rotor are described along with hot-wire and pressure probe measurements of wake patterns. Author

N75-13273*# Kanner (Leo) Associates, Redwood City, Calif.
AERODYNAMIC INVESTIGATION OF AN AIR-COOLED AXIAL-FLOW TURBINE. PART 1: TURBINE DESIGN AND OVERALL STAGE PERFORMANCE WITHOUT SUPPLY OF COOLING AIR
A. Yamamoto, K. Takahara, H. Nouse, S. Inoue, H. Usui, and F. Mimura Washington NASA Dec. 1974 71 p Transl. into ENGLISH from Nat. Aerospace Lab. Report No. NAL-TR-321-Pt-1 (Japan), 1973 34 p
(Contract NASw-2481)
(NASA-TT-F-16083; NAL-TR-321-Pt-1) Avail: NTIS HC $4.25 CSCL 21E

A single-stage turbine with a 22 inch diameter was designed to investigate air-cooled turbines operating in a high-temperature environment. The stator and rotor blades are characterized by low blade solidity, thick blade section, blunt leading edge and trailing edge, and low blade aspect ratio. The turbine satisfied the equivalent design value of specific work output at the design condition with an efficiency of 85.6%. It is concluded that the present airfoil shapes designed for an air-cooled turbine are satisfactory from an aerodynamic standpoint and that changes in the airfoil shape for cooling considerations did not noticeably impair the turbine overall performance. Author

N75-13274*# Kanner (Leo) Associates, Redwood City, Calif.
FUNDAMENTALS FOR THE DESIGN OF OIL MIST LUBRICATION SYSTEMS, PART 3
S. Pytko and K. Bednarek Washington NASA Jan. 1975 11 p Transl. into ENGLISH from Schmierungstechnik (West Germany), v. 4, no. 3, Mar. 1973 p 72-75
(Contract NASw-2481)
(NASA-TT-F-16100) Avail: NTIS HC $3.25 CSCL 11H

Formulae are given for calculating the rate at which oil mist must be supplied to sleeve bearings, sliding surfaces (carriages, rails), spur and worm gears, cams, chain gears, and chain conveyors. Guidelines are presented for determining feed-nozzle configurations, venting systems, and lubrication groove patterns. Author

N75-13275*# Kanner (Leo) Associates, Redwood City, Calif.
FUNDAMENTALS FOR THE DESIGN OF FOIL MIST LUBRICATION SYSTEMS (CONCLUSION)
S. Pytko and K. Bednarek Washington NASA Jan. 1975 18 p refs Transl. into ENGLISH from Schmierungstechnik (West Germany), v. 4, no. 4, 1973 p 104-108
(Contract NASw-2481)
(NASA-TT-F-16099) Avail: NTIS HC $3.25 CSCL 11H

Guidelines are given for determining pressure gradients in feed nozzles; for selecting oil mist generators in terms of output, oil and air preheating, and oil refill intervals; for selecting the type and viscosity of oils; for determining the dimensions of compressed-air and oil-mist lines; and for laying out systems without pockets that accumulate condensed oil. A sample system design is presented. Author

N75-13276# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
STABILITY, BEHAVIOUR AND VIBRATIONS OF AN ANNULAR PLATE UNDER UNIFORM COMPRESSION
Aviv Rosen and Avinoam Libai Oct. 1974 68 p refs Sponsored by Israel Min. of Def.
(TAE-229) Avail: NTIS HC $4.25

The behavior of an annular plate, free at its inner edge and simply supported at the outer one is experimentally investigated. A compressive inplane force is applied uniformly at the outer boundary. Deformations, strains frequencies, and mode shapes are explored over sub, trans, and post buckling regions. Experimental results for the buckling loads are compared. An approximate formula for the vibrations of the loaded annular plates is developed and compared with the experimental results. Good agreement is found between theory and experiments. The influence of initial geometrical imperfections on the behavior of the compressed plate is discussed. Author

N75-13277# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
MEASUREMENT OF ACCELERATION AND VELOCITY IN PARSONS-PEEBLES TURBINE GENERATOR SET, WITH OCTAVE BAND SPECTRA
L. X. Nepomuceno 17 Jul. 1974 38 p
(Rept-7407.721) Avail: NTIS HC $3.75

An investigation was conducted to determine the acceleration and velocity parameters of a turbine-generator system. Measurements were made at four points in the system. A diagram of the points where the measurements were made is provided. The test equipment and procedures are described. The results

are presented in numerical values for acceleration and velocity as well as for the octave band spectra. Author

N75-13278*# Mechanical Technology, Inc., Latham, N.Y.
EFFECTS OF VIBRATION AND SHOCK ON THE PERFORMANCE OF GAS-BEARING SPACE-POWER BRAYTON CYCLE TURBOMACHINERY. PART 4: SUPPRESSION OF ROTOR-BEARING SYSTEM VIBRATIONS THROUGH FLEXIBLE BEARING SUPPORT DAMPING
J. M. Tessarzik, T. Chiang, and R. H. Badgley May 1974 97 p refs
(Contract NAS3-15709)
(NASA-CR-134697; MTI-74TR30) Avail: NTIS HC $4.75 CSCL 21E

A bearing damper, operating on the support flexure of a pivoted pad in a tilting-pad type gas-lubricated journal bearing, has been designed, built, and tested under externally-applied random vibrations. The NASA Brayton Rotating Unit (BRU), a 36,000 rpm, 10-Kwe turbogenerator had previously been subjected in the MTI Vibration Test Laboratory to external random vibrations, and vibration response data had been recorded and analyzed for amplitude distribution and frequency content at a number of locations in the machine. Based on data from that evaluation, a piston-type damper was designed and developed for each of the two flexibly-supported journal bearing pads (one in each of the two three-pad bearings). A modified BRU, with dampers installed, has been re-tested under random vibration conditions. Root-mean-square vibration amplitudes were determined from the test data, and displacement power spectral density analyses have been performed. Results of these data reduction efforts have been compared with vibration tolerance limits. Results of the tests indicate significant reductions in vibration levels in the bearing gas-lubricant films, particularly in the rigidly-mounted pads. The utility of the gas-lubricated damper for limiting rotor-bearing system vibrations in high-speed turbomachinery has thus been demonstrated. Author

N75-13279# Los Alamos Scientific Lab., N.Mex.
ELECTRON BEAM WELDABILITY OF 21-6-9 STAINLESS STEEL
H. Casey 1974 14 p Presented at IMOG Joining Subgroup Meeting, St. Petersburg, Fla., 17-18 Apr. 1974
(Contract W-7405-eng-36)
(LA-UR-74-978; Conf-740456-1) Avail: NTIS HC $3.25

The stainless steel alloy designated as 21-6-9 is one of a family of austenitic stainless steels designed for applications where the strength requirements prohibit the use of the more common 300 series stainless steels. Substantial problems have been encountered with welded assemblies and in particular, with electron beam welding of this material. Erratic metal flow characteristics, violent erruptions and ejection of metal sputter from the molten weld pool are characteristic problems encountered with this material. Author

N75-13280# Mound Lab., Miamisburg, Ohio.
PULSE ARC WELDING COPPER TO COPPER
C. E. Gallaher 1 Nov. 1973 57 p
(Contract AT(33-1)-GEN-53)
(MLM-2067) Avail: NTIS HC $4.25

The production procedures are described for detonator-cable assembly programs which necessitate the attachment of a gold clad copper electrode wire to a gold clad copper weld juncture. The electrode wire is a detonator component while the weld juncture is a cable component. The detonator-to-cable attachment is accomplished by first crimping the electrode wire into the weld juncture and then pulse arc welding the wire-juncture assembly. This welding process produces the solid solution connection desirable in long-term storage of detonator cable assemblies. Author

N75-13281# Bendix Corp., Kansas City, Mo.
CHARACTERIZATION OF A CHROME-GOLD THIN FILM DEPOSITION PROCESS BY AUGER ANALYSIS
F. A. Clay Aug. 1974 18 p refs
(Contract AT(29-1)-613)
(BDX-613-1173) Avail: NTIS HC $3.25

A chromium-gold thin film deposited onto tantalum-nitride-coated aluminum oxide substrates was investigated in terms of deposition parameters, electrical resistivity, adhesion, and thermocompression bondability. Thermocompression bondability was acceptable for all films in the as-deposited condition; was marginal to unacceptable for stabilized films; and was acceptable for films which had been chemically etched after stabilizing. Auger electron spectroscopy was used to correlate degraded bondability with the presence of a chromium oxide contaminant formed on the gold bonding surface as a result of thermal stabilization. Production process parameters were established. Author (NSA)

N75-13282# Mound Lab., Miamisburg, Ohio.
MECHANICAL HANDLING AND PRECISION POSITIONING OF ULTRAFINE GOLD WIRE
T. K. Ferguson 15 Jul. 1974 12 p refs
(Contract AT(33-1)-GEN-53)
(MLM-2035) Avail: NTIS HC $3.25

The design and characteristics of several mechanical handling and precision positioning devices for ultrafine gold wire are discussed. The systems allow operators to achieve precision wire positioning and/or placement without the uncertainties of a manual operation. The use of these systems in production operations is a technological advancement in a field where previous work was performed entirely by manual techniques. Improvements in quality and overall efficiency have been realized from this development. Photographs of the equipment to show the operational procedures are provided. Author

N75-13283# Watervliet Arsenal, N.Y.
EFFECT OF SURFACE PROFILES ON CHARACTERISTICS OF CONCENTRIC RECOIL BEARINGS
Robert S. Montgomery Jun. 1974 27 p refs
(AD-780056/8; WVT-TR-74013) Avail: NTIS HC $3.75 CSCL 19/6

An object of the design of a concentric recoil bearing is to insure reliable full film lubrication over as much of the recoil and counter recoil motions as possible. The surface profile has a great effect on the oil film produced in the bearing. A straight bearing profile produces only a thin and unreliable film. A small taper on the leading edge greatly improves the situation. However, a shallow blind pocket in the loaded sector of the bearing was the best surface profile of those studied. Although the pocket was less than a mil deep, it resulted in a faster acting bearing and an appreciable thicker oil film. At the highest bearing pressure, the 10 millisecond film thickness was almost twice that of the next best profile studied. Author (GRA)

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques, and quality control.

N75-13284# Aeronautical Research Labs., Melbourne (Australia).
THE VISUALISATION OF THE PULSED OUTPUT FROM AN INDUSTRIAL ULTRASONIC FLAW DETECTOR
G. A. Hawkes and M. R. Kindermann Apr. 1974 13 p ref
(ARL-Met-NOTE-104) Avail: NTIS HC $3.25

A schlieren system is described which enables the pulsed output from an industrial ultrasonic flaw detector to be visualized. Initial results, consisting of a series of photographs of the ultrasonic pulse in water as it leaves different types of probe, are given and suggestions for improving the performance of the apparatus are discussed. Author

N75-13285# National Bureau of Standards, Washington, D.C. Electronic Technology Div.
SEMICONDUCTOR MEASUREMENT TECHNOLOGY: ARPA/NBS WORKSHOP 2. HERMETICITY TESTING FOR INTEGRATED CIRCUITS Final Report
Harry A. Schafft Dec. 1974 47 p refs
(ARPA Order 2397)
(NBS-SP-400-9) Avail: SOD HC $1.00 as C13.10:400-9

Synopses are presented of the six invited talks and two discussion periods of a meeting in which 65 engineers and scientists, representing 36 organizations from private industry

and government, participated. Topics ranged from failure analysis and the nature of leaks to evaluations and intercomparisons of bubble, weight, helium, and radioisotope tests. Underlying many of the problems discussed is the lack of a technical basis for specifications on maximum allowable leak rates and contaminant levels; no data are available to relate leak rate to component life. The proliferation of test conditions has complicated testing and test intercomparison efforts. Water vapor is shown to be a contaminant of major concern; the difficulties of making sufficiently accurate measurements of water vapor were detailed. The control required in the materials and assembly process to avoid hermeticity failure and false leak indications in ceramic, dual in-line packages was discussed. Author

N75-13286# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ULTRANSONIC INSPECTION OF MAIN UNDERCARRIAGE AXLE OF COMMERCIAL AIRCRAFTS
L. X. Nepomuceno, L. C. Giannini, and G. Molina 27 Jun. 1974 5 p In PORTUGUESE; ENGLISH summary
(TR-7406.718) Avail: NTIS HC $3.25

The ultrasonic inspection of the main landing gear for commercial aircraft is described. Results indicate the location of defects. Photos and echograms are included. Author

N75-13287# Federal Aviation Administration, Atlantic City, N.J.
AUTOMATED RELIABILITY ASSESSMENT PROGRAM Final Report, Sep. 1972 - Sep. 1973
John J. Wojciechowicz Apr. 1974 37 p
(FAA Proj. 121-101-070)
(AD-778935; FAA-RD-74-16; FAA-NA-73-85) Avail: NTIS HC $3.25

An Automated Reliability Assessment Program (ARAP) for evaluation of Federal Aviation Administration (FAA) equipments and systems is discussed. The ARAP is a set of procedures and computer programs used to reduce and analyze failure/maintenance data. In addition to reliability parameter estimation, related failure/maintenance characteristics are analyzed including failure modes, maintenance manhours, part replacement/failure rates, and part disposition. The ARAP has been in operation over the past two years and significant benefits in terms of assessment quality, manpower cost, and completion time, have been derived. It is recommended in the report that the ARAP be utilized to support reliability/maintainability activities at the National Aviation Facilities Experimental Center (NAFEC) and be considered for FAA-wide implementation. Author

N75-13288# Grimes (W.J.) and Co., Silver Spring, Md.
TERMINOLOGY AND METHODOLOGY USED IN RELIABILITY ANALYSIS
A. Carnino Jun. 1974 35 p refs Transl. into ENGLISH from the French report SETS-11 Sponsored by AEC
(AEC-tr-7558; SETS-11) Avail: NTIS HC $3.75

A summary of concepts and terms currently used in reliability is presented. A list of definitions of basic terms is followed by a presentation of the various methods of analysis used in reliability. The methods are supplemented by the symbology used in both the U.S. and England. Included are figures illustrating various methods described previously showing the conditions under which, in the opinion of the authors, they are best used for analyzing safety and the progress of reactor accidents. Author (NSA)

N75-13289# General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.
ULTRASONIC DETECTION OF DEFECTS IN THIN CERAMIC CYLINDERS
P. A. Fessler 19 Jul. 1974 9 p refs
(Contract AT(29-2)-656)
(GEPP-131) Avail: NTIS HC $3.25

A study was conducted to determine the feasibility of using a loss of back surface technique for ultrasonic inspection of thin-walled ceramic cylinders. The ultrasonic equipment used for the test is described and the procedures used are analyzed. Voids, cracks, and other types of defects in the ceramic cylinders were detected and ultrasonic plots were obtained. The cylinders used were 94 percent aluminum oxide with a wall-thickness of .095 inches. Author

N75-13290# General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.
WELD DEFECT DETECTION BY ULTRASONIC AND X-RAY METHODS
P. A. Fessler 29 Jul. 1974 15 p
(Contract AT(29-2)-656)
(GEPP-132) Avail: NTIS HC $3.25

X-ray and ultrasonic inspection techniques were used to determine the presence and size of defects in welds. The study was conducted to compare the two methods of inspection on standard weld defect specimens. A comparison of the results shows that some types of defects are indicated more prominently by one method than the other. The correlation between the defect sizes as determined by the two methods varied according to the defect size and shape. It was found that for many inspections, the two methods are complementary. Author

N75-13291# Army Air Mobility Research and Development Lab., Fort Eustis, Va.
HOSE CHAFE GUARD TESTS
Donald R. Artis, Jr. Apr. 1974 38 p refs
(AD-780052/7; USAAMRDL-TR-74-34) Avail: NTIS HC $3.75 CSCL 13/11

A series of tests were conducted to determine the operational suitability of using nylon 6/6 spiral cut tubing (coil) as a hose chafe guard on Army helicopters. The test effort was divided into five areas: Coil back-off tests; flight tests; temperature/wear tests; fluid compatability tests; and ozone, aging, and fungus investigations. Tests results and material investigation indicated that nylon 6/6 spiral cut tubing is a good hose chafe guard for the temperature band from -65 degrees to 225 degrees F, and it is recommended for retrofit to Army helicopters where temperatures do not exceed those bounds. Author (GRA)

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N75-13292+ Engineering Sciences Data Unit, London (England).
BUCKLING OF CORRUGATED SHEAR WEBS
Oct. 1974 23 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-74022) Copyright. Avail: NTIS HC $122.50

A method for estimating the buckling of corrugated webs under shear is presented. Overall instability of the whole web between the support members to which it is attached at its edges and local buckling of the flat plates of which the web is composed, are considered. The experimental data are presented and compared with theoretical predictions. Diagrams of the test structures are provided. Mathematical models are developed to support the theoretical presentation. Author

N75-13293+ Engineering Sciences Data Unit, London (England).
FATIGUE STRENGTH OF THICK CYLINDERS UNDER INTERNAL PRESSURE
Feb. 1967 6 p refs Sponsored by Roy. Aeron. Soc. and the Inst. of Mech. Engr.
(ESDU-67014-Amend-A) Copyright. Avail: NTIS HC $36.00

The results of about 110 fatigue tests on steel cylinders and 60 fatigue tests on aluminum alloy cylinders were analysed to give curves of q sub max/f sub t against N. The cylinders were pressurized with oil and supported the axial pressure loads by tension in the walls. The minimum pressure in the load cycle was effectively zero. The bores were given a good honed finish, the steel cylinders to less than 4 micro-inches (centre line average) and the aluminium cylinders to between 6 and 13 micro-inches (average reoughness height). Failure was judged to have occurred when oil from the interior started to leak through the walls. Author

N75-13294+ Engineering Sciences Data Unit, London (England).
AVERAGE AND EDGE STRESSES FOR SLIGHTLY CURVED PLATES WITH CLAMPED EDGES IN COMPRESSION WITH

INITIAL IRREGULARITIES (DELTA/t EQUALS 0.02)
1974 3 p
(ESDU-02.01.11-Amend-A) Copyright. Avail: NTIS HC $7.50

Curves are developed to analyze the average and edge stresses for slightly curved plates. The curves apply to isotropic plates of uniform curvature, with clamped edges but negligible lateral restraint. The effect of initial irregularities on the buckling stress is examined. Author

N75-13295 Virginia Univ., Charlottesville.
COUPLED THERMOELASTIC VIBRATIONS OF THIN SHELLS OF REVOLUTION Ph.D. Thesis
Howard Michael Adelman 1974 237 p
Avail: Univ. Microfilms Order No. 74-23304

Research, involving the determination of thermoelastic coupling effects on the free vibration characteristics and thermal relaxation behavior of thin shells of revolution, is presented. Of particular interest are the changes in natural frequency and thermal relaxation times as well as the amount of internal damping which is due to thermoelastic coupling. Biot's variational principles, specialized for thin shells of revolution is used to generate governing differential equations for a circular cylindrical shell. The equations are solved for a specific set of boundary conditions by substituting a set of exact mode shapes into the equations and deriving the characteristic polynomial which is then solved to give numerical results. Coupled thermoelastic equations for axisymmetric behavior of a circular plate are also derived by Biot's variational principle. These equations are solved by a perturbation approach for both bending and stretching modes. The damping results are found to be consistent with published experimental work. Dissert. Abstr.

N75-13296 Illinois Inst. of Tech., Chicago.
DECAYS ESTIMATES AND BOUNDS IN VISCOELASTICITY Ph.D. Thesis
Richard Eugene Neapolitan 1974 44 p
Avail: Univ. Microfilms Order No. 74-23991

For a viscoelastic beam loaded at one end and otherwise traction-free it is shown that a certain integral measure of the strain in that portion of the beam at distance greater than or equal to s decay exponentially with increasing s. This is a different integral decay estimate from that obtained previously by Edelstein and leads immediately to a pointwise decay estimate for strains. The estimate obtained is in terms of an integral involving the strain which reduces, in the elastic case, to twice the strain energy. Secondly, a bound for this integral involving the strain in terms of known boundary data is derived for the second boundary value problem in viscoelasticity. Dissert. Abstr.

N75-13297 Iowa State Univ. of Science and Technology, Ames.
ANALYSIS OF LAMINATED COMPOSITE CYLINDRICAL THICK SHELLS Ph.D. Thesis
Wen-chun Sun 1974 98 p
Avail: Univ. Microfilms Order No. 74-23769

The static deformation and stresses of laminated composite cylindrical shells under axisymmetrical internal pressure are investigated by using a refined shell theory which includes transverse shear deformation, transverse normal strain and expansional strain. Numerical examples are obtained for simply supported and fixed end conditions. Results are compared with solutions based on Flugge's shell theory. The classical method of separation of variables, combined with the Mindlin-Goodman procedure for treating time-dependent boundary conditions and/or dynamic external loadings, is extended to investigate the dynamic response of laminated composite shells. The validity of this method applied to laminated composite shells under axially symmetrical loadings is first established by showing that the principal modes of free vibration are orthogonal. The formal solution of the general forced vibration problem is then obtained. Specific examples are worked out for a simply supported laminated shell subjected to uniform time-dependent internal pressure. Dissert. Abstr.

N75-13298 Ohio State Univ., Columbus.
AN ELASTIC-PLASTIC INVESTIGATION OF THE SITE OF CRACK INITIATION IN ALUMINUM NOTCHED BARS SUBJECTED TO THREE POINT BENDING Ph.D. Thesis
Vincent John Russo 1974 192 p
Avail: Univ. Microfilms Order No. 74-24395

An elastic-plastic finite element computer program was used to examine the states of stress and strain at the roots of V-notches and U-notches in an effort to develop a criterion for predicting the site of crack initiation. Simple bending under conditions approximating plane stress were used to determine experimentally the sites to be well removed from the notch centerline. The paths of crack propagation followed the directions of pure shear strain. The slip line fields, i.e., the directions of pure shear strain, produced from the results of the finite element program agreed well with results expected from closed form solutions. Examinations of numerous stress/strain quantities along and between the slip lines were conducted in an effort to evolve a selectivity rule that could be used to predict which slip line would be activated to form a crack. Dissert. Abstr.

N75-13299 Delaware Univ., Newark.
THE ANALYSIS AND DESIGN OF COMPOSITE MATERIAL BONDED JOINTS UNDER STATIC AND FATIGUE LOADINGS Ph.D. Thesis
William James Renton 1974 448 p
Avail: Univ. Microfilms Order No. 74-26141

Extensive research was conducted providing analysis methods and design methodology for bonded joints in structures of laminated composite materials under static and fatigue loads. An analytical closed form solution has been developed for stresses and deformations in the adhesive joint and the adherends, including transverse shear deformations and normal strain, adherend anisotropy, and adhesive properties. A digital program provides rapid design and analysis; an inclusive parameter study provides trends and methodology. Static tests have been developed providing shear and extensional stiffness and ultimate stresses of the adhesive in the joint configurations. Fatigue tests were conducted for various geometries, loadings, and adherend materials. Dissert. Abstr.

N75-13300 Polish Academy of Sciences, Warsaw.
MATHEMATICAL THEORY OF DEFECTS [MATEMATYCZNA TEORIA DEFEKTOW]
Elzbieta Kossecka 1974 58 p refs In POLISH
(Rept-34/1974) Avail: Issuing Activity

Static and dynamic theories of defects in linearly elastic, homogeneous, and infinite continua were investigated. It was found that the formulations of these theories also have applications in the theory of dislocation. The theories are divided into geometric conditions (which are simultaneously conditions of constraints) and solutions of equilibrium equations which result from the theory of elasticity. M.J.S.

N75-13301 Polish Academy of Sciences, Warsaw.
REACTION IN A CONTINUOUS MEDIUM [ODDZIALYWANIA W OSRODKU CIAGLYM]
Wojciech Baranski 1974 72 p refs In POLISH
(Rept-36/1974) Avail: Issuing Activity

The axiomatic theory of reactions in a continuous medium, including both mechanical and thermal reactions, is discussed. The reactions are further subdivided into contact reaction and long range reaction where the contact reaction approximates the principle of strain and is called the generalized principle of strain. The generalized principle of strain is defined as the reaction of one body to another depending only on the shape of the contact areas common to the boundaries of those bodies. Other topics discussed include: concentrated and discontinuous reactions pertaining to Lebesgue's theorem; considerations of the geometric structure of the continuous medium; and the influence of loads. Transl. by M.J.S.

N75-13302 Case Western Reserve Univ., Cleveland, Ohio.
THE RESPONSE OF AN OVERHEAD CABLE TO STEADY AND TURBULENT WINDS Ph.D. Thesis
Robert Andrew Komenda 1974 148 p
Avail: Univ. Microfilms Order No. 74-25665

Aerodynamic and mechanical damping coefficients are used to determine the response of overhead cables to steady and turbulent winds. Experimental results from wind-tunnel studies of a scale model and laboratory evaluation of cable log decrement form the basis of a solution. The aerodynamic coefficients are amplitude dependent; this is handled by marching the solution forward in increments. The effect of parameter variation on the

response to a steady wind is discussed. Maximum vibration is shown to occur in the wintertime on an old cable at high tensions while minimum vibration occurs in the summertime on a new cable at low tension. A turbulent wind is simulated as a sequence of steady pulses. The steady wind aerodynamic coefficients are applied to each pulse and the solution is again marched forward. The key assumption in both the steady and turbulent response is the concept of locking-in. Dissert. Abstr.

N75-13303 Illinois Inst. of Tech., Chicago.
AN EXPERIMENTAL STUDY OF THE BUCKLING OF OPEN SHELLS Ph.D. Thesis
Tung Han Yang 1974 240 p
Avail: Univ. Microfilms Order No. 74-24003

An experimental study of open shell buckling was conducted and the results were compared with theoretical prediction of the mechanical behavior. The equations needed to obtain the critical gravity loading for an open cylindrical shell are derived from the membrane stresses equilibrium equation. Conditions are analyzed for transversely loaded and axially loaded open shells. It is stated that the small deflection analytical solution yields a more satisfactory prediction of buckling loads than does the large deflection theory. Agreement of measured results with predicted results is most satisfactory for the higher slenderness ratio groups. Dissert. Abstr.

N75-13304 Virginia Polytechnic Inst. and State Univ., Blacksburg.
THREE DIMENSIONAL FINITE ELEMENT ANALYSIS OF THICK LAMINATED COMPOSITES: INCLUDING INTERLAMINAR AND BOUNDARY EFFECTS NEAR CIRCULAR HOLES Ph.D. Thesis
Jon Ramon Dana 1974 94 p
Avail: Univ. Microfilms Order No. 74-23804

A three-dimensional finite-element solution for the state of stress in a laminated composite with a circular hole, loaded in axial extension, is presented. A curved isoparametric element with 24 nodal points and 72 degrees-of-freedom was used to model the individual layers of the laminate. The nodal displacements were determined by minimizing the total potential energy of the system at the element level with a conjugate gradient iterative method. Process error bounds on the strain energy were established. Three symmetric stacking sequences ((0/90) sub s, (90/0) sub s, and (-45/+45) sub s) were investigated for both thick and thin boron-epoxy laminates. The stress distribution around a hole in a laminated composite is found to require three-dimensional analysis. The maximum interlaminar normal stress is less than 30 percent of the average far-field in-plane normal stress for thick laminates. The maximum interlaminar shear stress within the lamina is less than 40 percent of the average far-field in-plane stress. Dissert. Abstr.

N75-13305 Michigan Univ., Ann Arbor.
FRACTURE INITIATION AND PROPAGATION IN NONUNIFORM COMPRESSIVE STRESS FIELDS Ph.D. Thesis
Nicholas James Altiero, Jr. 1974 138 p
Avail: Univ. Microfilms Order No. 74-25810

A theory of fracture initiation and propagation in isotropic elastic-brittle materials subjected to nonuniform compressive stress fields was developed and applied to a number of boundary-value problems. Macroscopic fracture is the coalescence of microcracks which propagate from preferentially oriented flaws in the material. Based on the Mohr criterion, a 'fracture function' is defined, a contour map of which can be drawn throughout the region. The extremum of this function defined fracture initiation and the minimum gradient determined the path of fracture propagation. A theoretical analysis was done for a class of boundary-value problems. The effects of loading, geometry, material properties, and confining pressure are discussed. An experimental study in which plaster models were loaded to failure shows that the theory accurately predicts the location of fracture initiation at a load level within 7% of the average test result. The theory also predicts the final shape of the fracture path and bounds the ultimate fracture load from above.
Dissert. Abstr.

N75-13306 Polish Academy of Sciences, Warsaw.
DERIVATION OF PHYSICAL EQUATIONS FOR ANY GIVEN SEGMENT OF A BAR GRID IN A SPATIAL STRUCTURE [WYPROWADZENIE ROWNAN FIZYCZNYCH DOWOLNEGO SEGMENTU SIATKI PRETOWEJ USTROJU PRZESTRZENNEGO]
Wojciech Dzieniszewski 1974 13 p In POLISH
(Rept-7/1974) Avail: Issuing Activity

A network spacial structure made up of prismatic rod segments connected rigidly in undeformable nodes is considered. These connections determine the dependence among internal strengths in the central section of the segment delta and among the components of displacement of its ends. Equations for these segments are derived. Transl. by M.J.S.

N75-13307 Polish Academy of Sciences, Warsaw. Inst. of Basic Problems of Technology.
THEORY OF CRACKING AND CLASSICAL ELASTOSTATICS [TEORIA PEKANIA A ELASTOSTATYKA KLASYCZNA]
Marek Sokolowski 1974 46 p refs In POLISH
(Rept-33/1974) Avail: Issuing Activity

General principles and basic consequences of Griffith's hypothesis of cracking are discussed in terms of limitations with regard to crack size. Topics discussed include: the classical theory of elasticity in the static range of infinitesimal deformations, superficial tension, discontinuous boundary conditions, stress concentration, and stress intensity and their relation to the Griffith crack. Berenblat and Sih hypotheses of cracking were also discussed briefly. M.J.S.

N75-13308 Polish Academy of Sciences, Warsaw.
MATHEMATICAL MODEL OF FISSURES IN AN ELASTIC MEDIUM [MATEMATYCZNY MODEL SZCZELIN W OSRODKU SPREZYSTYM]
Marek Matczynski 1974 39 p refs In POLISH
(Rept-41/1974) Avail: Issuing Activity

Solutions for the displacement and stress distributions in infinite elastic media weakened by a Griffith crack were found for static problems of cracks in a plane theory of elasticity. A two-dimensional theory of elasticity which was developed using the properties of harmonic potentials is discussed along with cracks with discontinuous horizontal displacement, and normal discontinuous displacement. Transl. by M.J.S.

N75-13309*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A REVIEW OF SURFACE-CRACK FRACTURE TESTING
Thomas W. Orange 1974 18 p refs Presented at Mater. Eng. Ann. Meeting of the Am. Soc. for Metals, Detroit, 21-24 Oct. 1974
(NASA-TM-X-71629; E-8163) Avail: NTIS HC $3.25 CSCL 20K

A brief historical review of surface-crack testing and analysis is given together with some examples of service failures due to surface cracks. The factors which complicate the analysis and interpretation of surface-crack fracture data are discussed. Current efforts to develop consensus recommendations for tensile testing of surface-crack specimens are summarized. Author

N75-13310*# Boeing Aerospace Co., Seattle, Wash.
UTILIZATION SURVEY OF PROTOTYPE STRUCTURAL TEST ARTICLE Final Report, 1 May - 30 Nov. 1974
Stanley Baber, H. M. McDaniel, and M. J. Berry 14 Oct. 1974 26 p refs
(Contract NAS8-30621)
(NASA-CR-120543; D180-18424-1) Avail: NTIS HC $3.75 CSCL 20K

A survey was conducted of six aerospace companies and two NASA agencies to determine how prototype structural test articles are used in flight operations. The prototype structures are airframes and similar devices which are used for testing and generally are not flown. The survey indicated the following: (1) prototype test articles are not being discarded after development testing is complete, but are used for other purposes, (2) only two cases of prototypes being refurbished and flown were identified, (3) protective devices and inspection techniques are available to prevent or minimize test article damage, (4) substitute programs from design verification are availabel in lieu of using prototype structural articles, and (5) there is a trend away from dedicated test articles. Four options based on these study results

were identified to reduce test and hardware costs without compromising reliability of the flight program. Author

N75-13311*# Grumman Aerospace Corp., Bethpage, N.Y.
VIBRATION AND STRESS ANALYSIS OF SOFT-BONDED SHUTTLE INSULATION TILES. MODAL ANALYSIS WITH COMPACT WIDELY SPACE STRINGERS
I. U. Ojalvo, F. Austin, and A. Levy Sep. 1974 136 p refs (Contract NAS1-10635)
(NASA-CR-132553) Avail: NTIS HC $5.75 CSCL 20K

An efficient iterative procedure is described for the vibration and modal stress analysis of reusable surface insulation (RSI) of multi-tiled space shuttle panels. The method, which is quite general, is rapidly convergent and highly useful for this application. A user-oriented computer program based upon this procedure and titled RESIST (REusable Surface Insulation Stresses) has been prepared for the analysis of compact, widely spaced, stringer-stiffened panels. RESIST, which uses finite element methods, obtains three dimensional tile stresses in the isolator, arrestor (if any) and RSI materials. Two dimensional stresses are obtained in the tile coating and the stringer-stiffened primary structure plate. A special feature of the program is that all the usual detailed finite element grid data is generated internally from a minimum of input data. The program can accommodate tile idealizations with up to 850 nodes (2550 degrees-of-freedom) and primary structure idealizations with a maximum of 10,000 degrees-of-freedom. The primary structure vibration capability is achieved through the development of a new rapid eigenvalue program named ALARM (Automatic LArge Reduction of Matrices to tridiagonal form). Author

N75-13312# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
FINITE LONGITUDINALLY MULTI-LAYERED MEMBRANE SHELLS SUBJECTED TO IMPACT LOADS
M. Ziv 11 Nov. 1974 44 p refs Backup document for AIAA Synoptic scheduled for publication in the AIAA Journal in Jun. 1975
Avail: NTIS HC $3.75

The transient response of a finite longitudinally multilayered cylindrical membrane shell impacted by longitudinal axisymmetric loads is obtained. Membrane stress distribution and particles' velocities are determined for the entire solution domain. The method of solution consists of characteristics finite difference technique and discontinuity relations. A characteristics finite difference integration scheme is constructed for regions where the variables are continuous. Discontinuity relations are developed to encounter the impulsive leading wave and its reflection and refraction at the interfaces. The generalized analysis is valid for any number of layers, unrestricted to length or material properties. Author

N75-13313# Indian Inst. of Tech., Madras. Composite Structures Section.
ASYMMETRIC IMPULSIVE LOADING OF SHALLOW SPHERICAL SHELLS
R. Palaninathan and V. X. Kunukkasseril 19 Dec. 1974 34 p refs Backup document for AIAA Synoptic scheduled for publication in the AIAA Journal in Jun. 1975
Avail: NTIS HC $3.75

Asymmetric forced response of shallow spherical shells to impulsive loading is considered on the basis of the theory which takes account of rotatory inertia and shear deformation effects. Explicit solutions are obtained for impulsive concentrated moment and tangential force applied at the apex. Relative contributions from longitudinal and transverse modes of shallow shells to total response due to different types of loading are discussed. Graphs are presented to show the effect of types of loading on the deformation with clamped and simply supported edges. Author

N75-13314*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NONLINEAR EQUATIONS OF MOTION FOR THE ELASTIC BENDING AND TORSION OF TWISTED NONUNIFORM ROTOR BLADES
D. H. Hodges and E. H. Dowell Washington Dec. 1974 60 p refs Prepared in cooperation with Army Air Mobility R and D Lab., Moffett Field, Calif.
(NASA-TN-D-7818; A-5711) Avail: NTIS HC $4.25 CSCL 20K

The equations of motion are developed by two complementary methods, Hamilton's principle and the Newtonian method. The resulting equations are valid to second order for long, straight, slender, homogeneous, isotropic beams undergoing moderate displacements. The ordering scheme is based on the restriction that squares of the bending slopes, the torsion deformation, and the chord/radius and thickness/radius ratios are negligible with respect to unity. All remaining nonlinear terms are retained. The equations are valid for beams with mass centroid axis and area centroid (tension) axis offsets from the elastic axis, nonuniform mass and stiffness section properties, variable pretwist, and a small precone angle. The strain-displacement relations are developed from an exact transformation between the deformed and undeformed coordinate systems. These nonlinear relations form an important contribution to the final equations. Several nonlinear structural and inertial terms in the final equations are identified that can substantially influence the aeroelastic stability and response of hingeless helicopter rotor blades. Author

N75-13315# Royal Aircraft Establishment, Farnborough (England).
THOUGHTS ON MINER'S FATIGUE DAMAGE RULE
M. Matolcsy Oct. 1974 18 p refs Transl. into ENGLISH from the Hungarian Presented at the Congr. on Mater. Testing, Budapest, 19-24 Oct. 1970
(RAE-Lib-Trans-1609; BR44232) Avail: NTIS HC $3.25

The derivation of Miner's fatigue rule is briefly outlined and limits of its applicability are indicated. The shortcomings of his basic assumptions are discussed in the light of more recent knowledge concerning such matters as load sequence effects, dislocation theory of internal work and problem of defining failure. Several newer damage rules from other authors are presented, with a brief indication of the improvements introduced. In conclusion, a list of conditions which should be fulfilled by an ideal damage rule is suggested. Author

N75-13316# National Aerospace Lab., Tokyo (Japan).
CONDITIONS REQUIRED TO SATISFY MINER'S HYPOTHESIS UNDER STATISTICAL CONSIDERATION
Toshiyuki Shimokawa 1974 13 p refs In JAPANESE; ENGLISH summary
(NAL-TR-370) Avail: NTIS HC $3.25

The conditions for Miner's hypothesis to hold statistically are discussed with regard to the distribution of fatigue life and the cumulative damage in fatigue process. The Weibull, the Normal, and the Log-normal distribution functions are taken as that of fatigue life, which are frequently used to represent the test data of fatigue life. This study leads to the following conditions: (1) the coefficient of variation of fatigue life is constant, regardless of the stress level for the three types of the distribution functions described above, and (2) the cumulative damage in the fatigue process is expressed by the damage curve, which is defined as the relation of the damage of a given specimen to its inherent cycle ratio n/N, where n is the number of cycles applied at a given stress level and N is the number of cycles to failure of the specimen at that stress level. It is assumed that the ascending order of the damage fraction of a given specimen in a group of specimens is invariable at any number of cycles under any applied stress level. Based on the assumption mentioned above, the condition concerning the cumulative damage in the fatigue process in that one damage curve is determined regardless of the ascending order of damage fraction of the specimen and the applied stress level, and that the increment of the damage of the specimen accumulated at the i-th stress level SI in a variable stress history agrees with that of the case of constant stress level test at SI. Author

N75-13317*# Lehigh Univ., Bethlehem, Pa. Inst. of Fractures Solid Mechanics.
AN ORTHOTROPIC LAMINATE COMPOSITE CONTAINING A LAYER WITH A CRACK
K. Arin Mar. 1974 55 p refs
(Grant NGR-39-007-011)
(NASA-CR-132567; IFSM-74-57; TR-74-1) Avail: NTIS HC $4.25 CSCL 20K

A laminate composite containing an orthotropic layer with a

crack situated normal to the interfaces, and bonded to two orthotropic half-planes of dissimilar materials was considered. The solutions for two different classes of orthotropic materials are presented. In each case, the problem was first reduced to a system of dual integral equations, then to a singular integral equation which was subsequently solved numerically for the stress intensity factors at the tip of the crack. The effect of the material properties on the stress intensity factor was investigated. The generalized plane stress and the plane strain were treated simultaneously. Author

N75-13318*# Lehigh Univ., Bethlehem, Pa. Inst. of Fracture and Solid Mechanics.
A NOTE ON THE EFFECT OF BENDING STIFFNESS OF STRINGERS ATTACHED TO A PLATE WITH A CRACK
K. Arin Jan. 1974 15 p refs
(Grant NGR-39-007-011)
(NASA-CR-132565; IFSM-74-55; TR-74-2) Avail: NTIS HC $3.25 CSCL 20K

An infinite stringer partially bonded to a plate through a layer of adhesive is considered. The stringer had bending as well as longitudinal stiffness. The effect of the stringer's bending rigidity on the stress intensity factor at the tip of the crack is illustrated. Shear stress distribution between the plate and the stringer and the stress intensity factors are obtained from the solution of a system of Fredholm integral equations. The continuity of displacements along the line of bond is represented by the equations. Author

N75-13319*# Lehigh Univ., Bethlehem, Pa.
FRACTURE OF COMPOSITE PLATES CONTAINING PERIODIC BUFFER STRIPS
F. Erdogan and M. Bakioglu Oct. 1974 27 p refs
(Grant NGR-39-007-011; NSF GK-42771X)
(NASA-CR-140878) Avail: NTIS HC $3.75 CSCL 20K

Fracture of a composite plate which consists of perfectly bonded parallel load carrying laminates and buffer strips is considered. Fatigue cracks appear and spread in main laminates or in buffer strips or in both perpendicular to the interfaces. The external load is applied to the plate parallel to the strips and away from the crack region. The problem is solved for fully imbedded cracks and for broken laminates or strips. Corresponding stress intensity factors are calculated. Author

N75-13320# Sandia Labs., Albuquerque, N.Mex.
SUBSEQUENT YIELDING OF AN ALUMINUM ALLOY FOLLOWING CYCLIC PRESTRAINING
J. Lipkin and J. C. Swearengen May 1974 47 p refs
(Contract AT(29-1)-789)
(SLA-74-197) Avail: NTIS HC $3.75

Thin-walled tubular samples of 6061 aluminum alloy were cycled in the axial direction between reversed stress limits until a steady-state condition was achieved. Following cyclic loading, the samples were subjected to internal pressure to determine the subsequent hoop tensile yield stength. A small-offset definition of yield is employed to relate the onset of plastic flow to dislocation processes. Samples in the T651 and O tempers were studied, and it was found that the subsequent yield strength determined in this way may be greater than, less than, or nearly equal to the initial hoop tensile yield strength depending on the interaction of three factors: (1) the relationship between the Bauschinger effect and the cross effect under plane, biaxial stress loading, (2) the initial state of the material (i.e., degree of initial anisotropy), and (3) the final state of the material after axial cyclic loading (i.e., dislocation structure and deformation history). Author

N75-13321# Boeing Aerospace Co., Kent, Wash.
ELEVATED TEMPERATURE ELASTIC-PLASTIC-CREEP TEST OF STIFFENED SHEAR-LAG PANEL Final Report, 29 Aug. 1972 - 28 Feb. 1974
R. L. Egger Feb. 1974 251 p Sponsored by AEC Prepared in cooperation with ORNL
(ORNL-SUB-3754-1; D180-17967-1) Avail: NTIS HC $8.50

A test program is described, the purposes of which were to provide elastic-plastic-creep structural test data for comparison with inelastic analysis predictions, and to demonstrate the capabilities of a Boeing high-temperature capacitive strain gage as a long-term stable strain-measuring device. The test specimen used was a shear-lag structure consisting of a thin, square, stainless-steel plate loaded in its plane through tapered stiffeners. A shear-lag specimen was instrumented with ten capacitive strain gages, heated to 1100 F and subjected to long-term tensile and compressive loads. The capacitive strain gage data from the long-term test are presented and discussed. In addition to the shear-lag specimen test data, appendices are included containing the material property data needed by an analyst for making analytical predictions for comparison with the test results. Author (NSA)

N75-13322# Pennsylvania State Univ., University Park. Dept. of Engineering Mechanics.
EFFECT OF BIAXIALITY IN CREEP-FATIGUE AT ELEVATED TEMPERATURES Annual Report, 1 Jan. - 31 Dec. 1973
S. Y. Zamrik Mar. 1974 35 p Sponsored by AEC
(ORNL-3649-2) Avail: NTIS HC $3.75

The effect of biaxiality in creep fatigue interaction at elevated temperature is being investigated. Biaxial fatigue tests were conducted with thin walled tubular specimens loaded with axial tension-compression and torsion. Biaxial strains were imposed under synchronous loading condition at 25 cycles per minute. Specimens were obtained from extruded 304 stainless steel rods, machined to specifications and annealed in an argon atmosphere at 1092 C. The experimental data covers biaxial fatigue tests at room, 1000 F, and 1200 F, biaxial cumulative fatigue damage tests under a high to low loading sequence at 1000 and 1200 F, and tensile properties tests at 900 to 1200 F. Author (NSA)

N75-13323# United Kingdom Atomic Energy Authority, Risley (England).
SIMPLE TRIANGULAR MEMBRANE FINITE ELEMENT
J. P. Ellington Apr. 1974 11 p refs
(TRG-2504(R)) Avail: AEC Depository Libraries HC $4.00

The transformation matrix connecting local axes lying in the plane of an arbitrarily oriented simple triangular membrane finite element, and the overall, or global, axes, is established and used to transform the local stiffness matrix and nodal loads of a triangular constant-strain element to give global representation. Author (NSA)

N75-13324# Los Alamos Scientific Lab., N.Mex.
PLACID: A GENERAL FINITE ELEMENT COMPUTER PROGRAM FOR STRESS ANALYSIS OF PLANE AND AXISYMMETRIC SOLIDS
R. G. Lawton May 1974 33 p refs
(Contract W-7405-eng-36)
(LA-5621-MS) Avail: NTIS HC $3.75

A finite element computer program for inputting data for the solution of solid mechanics problems for plane or axisymmetric bodies. Material properties can be nonlinear, time- and/or temperature dependent, and can have complete three-dimensional anisotropy. Because all input is programmed by the user, the complexity of the input is directly related to the complexity of the problem. The program offers an implicit solution to the general plane strain problem, and the number of modes and elements can be very large. Author

N75-13325# California Univ., Berkeley. Dept. of Materials Science and Engineering.
COMPARATIVE FRACTURE TOUGNESS TESTING OF CRYOGENIC ALLOYS AT LIQUID HELIUM TEMPERATURE
Sungho Jin, S. K. Hwang, and J. W. Morris, Jr. Aug. 1974 24 p refs Sponsored in part by AEC
(Contract N00014-69-A-0200-1062; NR Proj. 031-762)
(AD-786229; TR-5) Avail: NTIS CSCL 11/6

Fracture behavior of the Fe-12Ni-0.25Ti alloy grain refined through thermal cycling was studied down to liquid helium temperature using a simple method of cryogenic fracture toughness testing. Comparison tests were also made with two other common cryogenic alloys. Ultrafine grained Fe-12Ni-0.25Ti alloy, which is 100% ferritic, behaved in a ductile manner similar to 304 austenitic steel. It was shown that the ductile-brittle transition temperature of the ferritic steel specimen can be suppressed below liquid helium temperature by grain refinement even in the presence of a sharp crack. Yield strength at liquid

nitrogen temperature, and yield strength at liquid helium temperature were obtained. (Modified author abstract) GRA

N75-13326# Newcastle-upon-Tyne Univ. (England). Dept. of Metallurgy and Engineering Materials.
DYNAMIC FRACTURE TOUGHNESS MEASUREMENT Final Report, May 1973 - Apr. 1974
J. Congleton and B. K. Denton Jun. 1974 49 p refs
(Contract DAJA37-73-C-3885)
(AD-784670) Avail: NTIS CSCL 11/2

Combined tensile-impact tests were performed on silicon nitride, alumina and magnesia. It was found that a wide range of crack velocity was encompassed and the detailed crack acceleration behaviour was unpredictable. An improved crack-velocity monitoring procedure was developed to cope with these difficulties. A system for open-camera, single-shot oscilloscope work has been devised that gives an extended record time at fast sweep rates. This was accomplished by using the signal to modulate the radius of a circular time base and the trigger to intensify a pre-blanked trace. Preparations for combined tensile-impact tests on high strength steels were completed. A study of the stress system induced by the impact procedure was performed. Also, calibration procedures using the self-resistance of the cracking specimen to monitor crack growth have been completed and a recording system has been developed to monitor pretrigger and post trigger crack velocity data. GRA

N75-13327# Battelle Columbus Labs., Ohio.
AN ATOMISTIC APPROACH TO DEFORMATION AND FRACTURE OF MATERIALS Final Report
R. G. Hoagland, P. C. Gehlen, and J. P. Hirth (Ohio State Univ.)
7 Jun. 1974 16 p refs
(Grant AF-AFOSR-2028-71; AF Proj. 9761)
(AD-783286; AFOSR-74-1221TR) Avail: NTIS CSCL 20/12

This report summarizes research concerning a critical test of atomic-scale computer simulation applied to the mechanical properties of materials. Because of certain advantages of the interatomic potential of ionic solids this work is confined to potassium chloride. The development and results derived from this research conclusively indicate that atomic-scale simulation has become a valid research tool for illuminating happenings on an atomic scale and for the quantitative measurement of fundamental strength parameters. (Modified author abstract) GRA

42 GEOSCIENCES (GENERAL)

N75-13328# Joint Publications Research Service, Arlington, Va.
SOVIET BLOC RESEARCH IN GEOPHYSICS, ASTRONOMY, AND SPACE, NO. 338
10 Dec. 1974 41 p refs Transl. into ENGLISH from Russian articles
(JPRS-63623) Avail: NTIS HC $3.75

Articles on meteorology, oceanography, upper atmosphere and space research, astronomy, and terrestrial geophysics are presented. Soviet space events are included. Author

N75-13329# Saad (Geti), Karachi (Pakistan).
GEOCHEMICAL FUNDAMENTALS OF THE TYPOLOGY AND PROCEDURE FOR STUDYING
M. A. Glazovskaya 1974 329 p Transl. into ENGLISH of the monograph "Geokhimicheskie Osnove Tipolotii i Metodiki Issledovanie Prirodnekh Landshaftov" Sponsored by NSF and Geological Survey
(TT-71-53154) Avail: NTIS HC $9.50 CSCL 08G

Geochemistry of landscapes is the study of the principles of migration of chemical elements in the geographical envelope of the earth, which involves the existing classification of landscapes, in which one of the main characteristic facts appears to be interaction of the components of natural media. The first task is to isolate the typology of the most homologous geographical units. The second task aims at the examination of different descents of combined landscapes, representing more complex forms, and the establishment of systematic principles regarding their typology. GRA

N75-13330# Wahler (W.A.) and Associates, Palo Alto, Calif.
EMERGENCY INVESTIGATION OF COAL MINE REFUSE EMBANKMENTS Final Report
Jun. 1974 74 p
(Contract S0122084)
(PB-234104/8; DI-MESA-74-002) Avail: NTIS HC $4.25 CSCL 08I

Following the coal refuse dam failure near Saunders, West Virginia, which caused the Buffalo Creek flood disaster on February 26, 1972, the Department of the Interior Task Force to Study Coal Waste Hazards was created on March 2, 1972, by the Assistance Secretary of Interior for Mineral Resources. The purpose of this emergency investigation was to reduce, to the greatest degree possible, the probability and consequences of coal refuse embankment failures at sites where the potential for failure had been recognized. Data was gathered concerning 139 potentially hazardous coal waste embankments in Alabama, Kentucky, Ohio, Pennsylvania, Virginia and West Virginia. These data and subsequent data gathered by revisiting most of the sites one year later were evaluated and final hazard classifications were made by the Board. This report presents the Board's final determinations, the methodology used, and the conclusions reached. GRA

N75-13331# Battelle-Northwest, Richland, Wash.
DEVELOPMENT OF INSTRUMENTATION TO MONITOR THE RADIAL DEFORMATION OF THE MEDIUM AROUND AN UNDERGROUND OPENING. PART 1: SELF-CONTAINED SYSTEM Final Report, 29 Sep. 1972 - 15 Nov. 1973
D. E. Rasmussen 15 Nov. 1973 45 p refs
(Contract H0220028; ARPA Order 1579)
(AD-785240) Avail: NTIS CSCL 08/9

The instrumentation developed provides unique tools for the study of stability of underground openings particularly where deformation measurements are required very close to a drilled or blasted opening and where extended periods of automatic data recording is needed. (Modified author abstract) GRA

N75-13332# Battelle-Northwest, Richland, Wash.
DEVELOPMENT OF INSTRUMENTATION TO MONITOR THE RADIAL DEFORMATION OF THE MEDIUM AROUND AN UNDERGROUND OPENING. PART 2: LASER SYSTEM Final Report, 29 Sep. 1972 - 15 Nov. 1973
W. J. Coleman Nov. 1973 68 p
(Contract H0220028; ARPA Order 1579)
(AD-785241) Avail: NTIS CSCL 08/9

The instrumentation developed provides unique tools for the study of stability of underground openings particularly where deformation measurements are required very close to a drilled or blasted opening and where extended periods of automatic data recording are needed. The Laser System employs a coarse and fine raster scanning concept to measure relative motion of passive targets. The course scan locates a target within a 1-in. square (approximate) field of view; the fine scan locates the target's position within the 1-in. square. The concept, in theory, should have very good accuracy and repeatability but depends upon the capabilities of the instrument components. Details of the concept are contained in Appendix B. GRA

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N75-13333*# Kansas Univ. Center for Research, Inc., Lawrence. Space Technology Center.
DETECTION OF MOISTURE AND MOISTURE RELATED PHENOMENA FROM SKYLAB Monthly Progress Report, Oct. 1974
Joe R. Eagleman, Principal Investigator and Richard Sloan Oct.

1974 4 p EREP
(Contract NAS9-13273)
(E75-10007; NASA-CR-140586; TR-239-18) Avail: NTIS HC $3.25 CSCL 08H

There are no author-identified significant results in this report.

N75-13334*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE ERTS-1 INVESTIGATION. VOLUME 7: ERTS-1 LAND-USE ANALYSIS OF THE HOUSTON AREA TEST SITE Final Report, Jul. 1972 - Jun. 1973
R. Bryan Erb, Principal Investigator Jun. 1974 110 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Fall, S. D. 57198 ERTS
(E75-10009; NASA-TM-X-58124) Avail: NTIS HC $5.25 CSCL 08B

There are no author-identified significant results in this report.

N75-13335*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
USE OF FEATURE EXTRACTION TECHNIQUES FOR THE TEXTURE AND CONTEXT INFORMATION IN ERTS IMAGERY: SPECTRAL AND TEXTURAL PROCESSING OF ERTS IMAGERY Final Report, 1 Aug. 1972 - 17 Mar. 1974
Robert H. Haralick, Principal Investigator and Robert J. Bosley 17 Mar. 1974 99273 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21822)
(E75-10011; NASA-CR-140655) Avail: NTIS HC $8.50 CSCL 05B

The author has identified the following significant results. A procedure was developed to extract cross-band textural features from ERTS MSS imagery. Evolving from a single image texture extraction procedure which uses spatial dependence matrices to measure relative co-occurrence of nearest neighbor grey tones, the cross-band texture procedure uses the distribution of neighboring grey tone N-tuple differences to measure the spatial interrelationships, or co-occurrences, of the grey tone N-tuples present in a texture pattern. In both procedures, texture is characterized in such a way as to be invariant under linear grey tone transformations. However, the cross-band procedure complements the single image procedure by extracting texture information and spectral information contained in ERTS multi-images. Classification experiments show that when used alone, without spectral processing, the cross-band texture procedure extracts more information than the single image texture analysis. Results show an improvement in average correct classification from 86.2% to 88.8% for ERTS image no. 1021-16333 with the cross-band texture procedure. However, when used together with spectral features, the single image texture plus spectral features perform better than the cross-band texture plus spectral features, with an average correct classification of 93.8% and 91.6%, respectively.

N75-13336*# Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
EVALUATION OF SKYLAB IMAGERY AS AN INFORMATION SERVICE FOR INVESTIGATING LAND USE AND NATURAL RESOURCES Progress Report, Oct. 1974
Ernest E. Hardy, Principal Investigator 31 Oct. 1974 12 p EREP
(Contract NAS9-13364)
(E75-10013; NASA-CR-140651) Avail: NTIS HC $3.25 CSCL 08B

There are no author-identified significant results in this report.

N75-13337*# Brevard County Planning Dept., Titusville, Fla.
PLANNING APPLICATIONS IN EAST CENTRAL FLORIDA Progress Report, 1 Aug. - 30 Sep. 1974
John W. Hannah, Principal Investigator, Garland L. Thomas, Fernando Esparza (NASA, Kennedy Space Center), and James J. Millard (NASA, Kennedy Space Center) 30 Sep. 1974 21 p ERTS
(Contract NAS5-21847)
(E75-10015; NASA-TM-X-72076) Avail: NTIS HC $3.25 CSCL 08B

There are no author-identified significant results in this report.

N75-13338*# California Earth Science Corp., Santa Monica.
FAULT TECTONICS AND EARTHQUAKE HAZARDS IN THE PENINSULAR RANGES, SOUTHERN CALIFORNIA Monthly Progress Report, Sep. 1974
Paul M. Merifield and Donald L. Lamar, Principal Investigators 5 Oct. 1974 4 p EREP
(Contract NAS2-7698)
(E75-10022; NASA-CR-140736; MPR-16) Avail: NTIS HC $3.25 CSCL 08G

The author has identified the following significant results. ERTS and Skylab images reveal a number of prominent lineaments in the basement terrane of the Peninsular Ranges, Southern California. The major, well-known, active, northwest trending, right-slip faults are well displayed, but northeast and west to west-northwest trending lineaments are also present. Study of large-scale airphotos followed by field investigations have shown that several of these lineaments represent previously unmapped faults. Pitches of striations on shear surfaces of the northeast and west trending faults indicate oblique-slip movement; data are insufficient to determine the net-slip. These faults are restricted to the pre-Tertiary basement terrane and are truncated by the major northwest trending faults; therefore, they may have formed in response to an earlier stress system. Future work should be directed toward determining whether the northeast and west trending faults are related to the presently active stress system or to an older inactive system, because this question relates to the earthquake risk in the vicinity of these faults.

N75-13339*# Nebraska Univ., Lincoln.
SATELLITE PICTURES CAN HELP GUIDE SANDHILLS IRRIGATION
James V. Drew, Principal Investigator, David T. Lewis, Leslie F. Sheffield, and Paul M. Seevers 27 Sep. 1974 ,3 p Repr. from Nebraska Farmer, 7 Sep. 1974 p 38-40 Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21756)
(E75-10023; NASA-CR-140737) Avail: NTIS HC $3.25 CSCL 08H

There are no author-identified significant results in this report.

N75-13340*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
MAPPING OF THE MAJOR STRUCTURES OF THE AFRICAN RIFT SYSTEM
P. A. Mohr, Principal Investigator 29 Oct. 1974 90 p refs ERTS
(Contract NAS5-21748)
(E75-10024; NASA-CR-140738; SAO-Special-Rept-361; SAO-403-004) Avail: NTIS HC $4.75 CSCL 08B

The author has identified the following significant results. The ERTS-1 satellite imagery has facilitated a major advance in accurate mapping and better understanding of the African Rift valleys. A unified scheme of mapping of the whole rift system, from Malawi to Ethiopia, has been accomplished. The structures revealed by the imagery are discussed in the light of known ground truth for the northern half of the African Rift System. The ERTS-revealed structures confirm the likelihood of a drift of Arabia away from Africa and impose constraints on the drift vectors. Numerous features have been newly recognized from the imagery: the gently curvilinear plan of virtually all the African Rift valleys, the pervasive but not overriding degree of influence of Precambrian structures on rift faulting, the deep structural control of many rift volcanic centers, the occurrence of several unsuspected calderas both in the rifts and on the plateaus, and massive cauldron subsidence phenomena previously unknown to eastern Africa. Lithological mapping in eastern Africa can be greatly refined using the ERTS imagery, and new or revised subdivisions of the Precambrian appear possible and, in some

places, necessary. Valleys excavated in the Ethiopian highlands by Pleistocene glaciers are newly recognized.

N75-13341*# National Aeronautics and Space Administration. Mississippi Test Facility, Bay Saint Louis.
EVALUATION OF SATELLITE REMOTE SENSING AND AUTOMATIC DATA TECHNIQUES FOR CHARACTERIZATION OF WETLANDS AND COASTAL MARSHLANDS
Robert H. Cartmill, Principal Investigator [1974] 1 p ERTS
(E75-10025; NASA-TM-X-72062) Avail: NTIS HC $3.25 CSCL 08B

The author has identified the following significant results. ERTS digital data has been used to detect and measure accretion in the large estuarial system of the Atchafalaya River in southern Louisiana. Comparisons of aerial photography taken in October 1970 with a computer printout of ERTS digital data collected on October 1, 1972, show that in a delineated area of 1400 hectares (3460 acres) an accretion of land area in the amount of 112 hectares (277 acres) had occurred. Analysis of band 3 of the ERTS MSS was used to make a land-water map of the area. The accretion test area was marked on this map and the percentage of elements indicated as land was calculated. This percentage was then multiplied by the total test area to obtain the area of land on the date of the ERTS observation for comparison with the aerial photography. Significant improvement in classification accuracy of ERTS MSS data has been achieved by use of a priori probabilities of occurrence in pattern recognition programs. Two classifications were made with accuracies of 76.0% and 81.5%, respectively.

N75-13342*# Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.
WATER SURVEY OF CANADA: APPLICATION FOR USE OF ERTS-A FOR RETRANSMISSION OF WATER RESOURCES DATA Progress Report, Jun. 1973 - Jul. 1974
R. A. Halliday, Principal Investigator and I. A. Reid Oct. 1974 10 p Sponsored by NASA ERTS
(E75-10026; NASA-CR-140739) Avail: NTIS HC $3.25 CSCL 08H

The author has identified the following significant results. Water resources data were retransmitted from nine data collection platforms (DCP) located in remote regions of Canada. The DCPs located in the Arctic operated in temperatures lower than -40 C and the DCP antennas have survived wind speeds of greater than 80 kph and snow loads of a depth of one metre. Ice-out indicators were installed at a few DCP sites. The purpose of these indicators was to enable the detection of the movement of ice out of river channel during spring break-up. The suitability of satellite retransmission as a means of obtaining data from remote areas of Canada continues to be demonstrated. A modest expansion of the DCP network is planned.

N75-13343*# Environmental Research Inst. of Michigan, Ann Arbor.
OIL POLLUTION DETECTION, MONITORING AND LAW ENFORCEMENT Quarterly Progress Report, Aug. 1974
Robert Horvath, Principal Investigator 22 Oct. 1974 2 p EREP
(Contract NAS9-13281)
(E75-10027; NASA-CR-140740; ERIM-101800-14-P) Avail: NTIS HC $3.25 CSCL 08J

There are no author-identified significant results in this report.

N75-13344*# National Aeronautics and Space Administration. Mississippi Test Facility, Bay Saint Louis.
EVALUATION OF SATELLITE REMOTE SENSING AND AUTOMATIC DATA TECHNIQUES FOR CHARACTERIZATION OF WETLANDS AND COASTAL MARSHLANDS Final Report, Jul. 1972 - Jun. 1974
Robert H. Cartmill, Principal Investigator 29 Jul. 1974 139 p refs Original contains color illustrations. Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(E75-10028; NASA-TM-X-72063; Rept-128) Avail: NTIS HC $5.75 CSCL 05B

The author has identified the following significant results. The evaluation was conducted in a humid swamp and marsh area of southern Louisiana. ERTS digital multispectral scanner data was compared with similar data gathered by intermediate altitude aircraft. Automatic data processing was applied to several data sets to produce simulated color infrared images, analysis of single bands, thematic maps, and surface classifications. These products were used to determine the effectiveness of satellites to monitor accretion of land, locate aquatic plants, determine water characteristics, and identify marsh and forest species. The results show that to some extent all of these can be done with satellite data. It is most effective for monitoring accretion and least effective in locating aquatic plants. The data sets used show that the ERTS data is superior in mapping quality and accuracy to the aircraft data. However, in some applications requiring high resolution or maximum use of intermittent clear weather conditions, data gathering by aircraft is preferable. Data processing costs for equivalent areas are about three times greater for aircraft data than ERTS data. This is primarily because of the larger volume of data generated by the high resolution aircraft system.

N75-13345*# American Univ., Washington, D.C. Drought Analysis Lab.
UTILIZATION OF ERTS-1 IMAGERY IN CULTIVATION AND SETTLEMENT SITE IDENTIFICATION AND CARRYING CAPACITY ESTIMATES IN UPPER VOLTA AND NIGER
Priscilla Reining Nov. 1973 172 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21970)
(E75-10029; NASA-CR-140570) Avail: NTIS HC $6.25 CSCL 08B

There are no author-identified significant results in this report.

N75-13346*# California Earth Science Corp., Santa Monica.
ANALYSIS OF PSEUDOCOLOR TRANSFORMATIONS OF ERTS-1 IMAGES OF SOUTHERN CALIFORNIA AREA
P. M. Merifield, Principal Investigator, D. L. Lamar, R. H. Stratton, J. V. Lamar, and Carl Gazley, Jr. Oct. 1974 27 p refs Prepared in cooperation with the RAND Corp., Santa Monica, Calif. Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contracts NAS2-7698; DI-14-08-0001-13911)
(E75-10037; NASA-CR-140774; TR-74-2) Avail: NTIS HC $3.75 CSCL 05B

The author has identified the following significant results. Representative faults and lineaments, natural features on the Mojave Desert, and cultural features of the southern California area were studied on ERTS-1 images. The relative appearances of the features were compared on a band 4 and 5 subtraction image, its pseudocolor transformation, and pseudocolor images of bands 4, 5, and 7. Selected features were also evaluated in a test given students at the University of California, Los Angeles. Observations and the test revealed no significant improvement in the ability to detect and locate faults and lineaments on the pseudocolor transformations. With the exception of dry lake surfaces, no enhancement of the features studied was observed on the bands 4 and 5 subtraction images. Geologic and geographic features characterized by minor tonal differences on relatively flat surfaces were enhanced on some of the pseudocolor images.

N75-13347*# Nebraska Univ., Lincoln.
USE OF ERTS-1 IMAGERY TO INTERPRET WIND-EROSION HAZARD IN THE SANDHILLS OF NEBRASKA
James V. Drew, Principal Investigator, Paul M. Seevers, and David T. Lewis 22 Nov. 1974 16 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21756)
(E75-10044; NASA-CR-140781) Avail: NTIS HC $3.25 CSCL 08F

There are no author-identified significant results in this report.

N75-13348*# Environmental Research Inst. of Michigan, Ann Arbor.
SKYLAB WATER DEPTH DETERMINATION Quarterly Progress Report, 1 Sep. - 30 Nov. 1973
F. C. Polcyn and D. R. Lyzenga, Principal Investigators 25 Nov. 1974 3 p EREP
(Contract NAS9-13278)
(E75-10048; NASA-CR-140950; ERIM-102100-11-L) Avail: NTIS HC $3.25 CSCL 08J

There are no author-identified significant results in this report.

N75-13349*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
DESIGN DATA FOR RADARS BASED ON 13.9 GHz SKYLAB SCATTERING COEFFICIENT MEASUREMENTS Advance Report of Significant Results
R. K. Moore, Principal Investigator Nov. 1974 18 p refs EREP
(Contract NAS9-13331)
(E75-10049; NASA-CR-140951; RSL-TR-243-7) Avail: NTIS HC $3.25 CSCL 17I

The author has identified the following significant results. Measurements made at 13.9 GHz with the radar scatterometer on Skylab have been combined to produce median curves of the variation of scattering coefficient with angle of incidence out to 45 deg. Because of the large number of observations, and the large area averaged for each measured data point, these curves may be used as a new design base for radars. A reasonably good fit at larger angles is obtained using the theoretical expression based on an exponential height correlation function and also using Lambert's law. For angles under 10 deg, a different fit based on the exponential correlation function, and a fit based on geometric optics expressions are both reasonably valid.

N75-13350*# Agricultural Research Service, Weslaco, Tex.
IRRIGATION SCHEDULING, FREEZE WARNING AND SOIL SALINITY DETECTING Monthly Progress Report, Nov. 1974
Craig L. Wiegand, Principal Investigator Nov. 1974 4 p EREP
(NASA Order T-4105-B)
(E75-10050; NASA-CR-140952; MPR-11) Avail: NTIS HC $3.25 CSCL 02C

There are no author-identified significant results in this report.

N75-13351*# Geological Survey, Denver, Colo.
REMOTE SENSING GEOPHYSICS FROM SKYLAB Monthly Report, Oct. 1974
Kenneth Watson, Principal Investigator and H. A. Pohn Oct. 1974 2 p EREP
(NASA Order T-6555-B)
(E75-10051; NASA-CR-140953) Avail: NTIS HC $3.25 CSCL 08G

There are no author-identified significant results in this report.

N75-13352*# Geological Survey, Denver, Colo.
REMOTE SENSING GEOPHYSICS FROM SKYLAB Monthly Report, Sep. 1974
Kenneth Watson, Principal Investigator and H. A. Pohn Sep. 1974 3 p EREP
(NASA Order T-6555-B)
(E75-10052; NASA-CR-140954) Avail: NTIS HC $3.25 CSCL 08G

There are no author-identified significant results in this report.

N75-13353*# Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.
WATER SURVEY OF CANADA: APPLICATION FOR USE OF ERTS-A FOR RETRANSMISSION OF WATER RESOURCES DATA Final Report, Jul. 1972 - Jun. 1974
R. A. Halliday, Principal Investigator and I. A. Reid Aug. 1974 27 p refs Sponsored by NASA ERTS
(E75-10053; NASA-CR-140959) Avail: NTIS HC $3.75 CSCL 08H

The author has identified the following significant results. Water resources data including water level, water velocity, precipitation, air temperature, ice condition, DCP battery voltage, and water stage recorder clock operation have been transmitted from remote areas in Canada using the ERTS Data Collection System. The Data Collection Platforms have met all requirements. The suitability of satellite retransmission as a means of obtaining data from remote areas has been demonstrated. The present network of 9 Data Collection Platforms will be expanded to 28 to develop a quasi-operational network.

N75-13354*# Geological Survey, Denver, Colo.
APPLICATION OF SKYLAB EREP PHOTOGRAPHS TO STUDY OF THE MODERN EPISODE OF ACCELERATED EROSION IN SOUTHERN ARIZONA Progress Report, 1 Jan. - 30 Jun. 1974
Roger B. Morrison, Principal Investigator 1 Jul. 1974 12 p EREP
(NASA Order T-4113-B)
(E75-10054; NASA-CR-140962) Avail: NTIS HC $3.25 CSCL 08M

The author has identified the following significant results. Indexing and analysis of the SL 2, SL 3, and SL 4 photos of the project area has shown that S-190A coverage with less than 30% clouds totals about 123,000 sq km. The 70-mm unenlarged color, color-infrared, B/W red, and B/W green bands from S-190A are of good to excellent quality; the B/W IR bands from SL 2 are excessively grainy and have very low resolution; those from SL 3 are better but nevertheless have low resolution. The 5-inch unenlarged color transparencies from S-190B are generally of excellent photographic quality. However, where cloud cover is extensive, commonly the S-190A and S-190B color and color-IR photos are correctly exposed for the clouds but considerably underexposed for the ground. The 4X enlargements of all bands of S-190A photos taken by SL 2 are much fuzzier than they should be; evidently the enlarger was not focused properly. The 4X enlargements from SL 3 are much superior.

N75-13355*# Geological Survey, Denver, Colo.
APPLICATIONS OF SKYLAB EREP PHOTOGRAPHS TO MAPPING OF LANDFORMS AND ENVIRONMENTAL GEOLOGY IN THE GREAT PLAINS AND MIDWEST Progress Report, 1 Jan. - 30 Jun. 1974
Roger B. Morrison, Principal Investigator 1 Jul. 1974 32 p EREP
(NASA Order T-4647-B)
(E75-10055; NASA-CR-140963) Avail: NTIS HC $3.75 CSCL 08B

The author has identified the following significant results. The utility of Skylab 2 and 3 S-190A multispectral photos for environmental-geologic/geomorphic applications is being tested by using them to prepare 1:250,000-scale maps of geomorphic features, surficial geology, geologic linear features, and soil associations of large, representative parts of the Great Plains and Midwest. Parts of Nebraska, Iowa, Missouri, and South Dakota were mapped. The maps were prepared primarily by interpretation of the S-190A photos, supplemented by information from topographic, geologic, and soil maps and reports. The color band provides the greatest information on geology, soils, and geomorphology; its resolution also is the best of all the multispectral bands and permits maximum detail of mapping. The color-IR band shows well the differences in soil drainage and moisture, and vegetative types, but has only moderate resolution. The B/W-red band is superior for topographic detail and stream alinements. The B/W-infrared bands best show differences in soil moisture and drainage but have poor resolution, especially those from SL 2. The B/W-green band generally is so low contrast and degraded by haze as to be nearly useless. Where stereoscopic coverage is provided, interpretation and mapping are done most efficiently using a Kern PG-2 stereoplotter.

N75-13356*# Geological Survey, Reston, Va.
URBAN AND REGIONAL LAND USE ANALYSIS: CARETS AND CENSUS CITIES EXPERIMENT PACKAGE Monthly Progress Report, Oct. 1974
Robert Alexander, Principal Investigator and Harry F. Lins, Jr. Oct. 1974 2 p EREP

(NASA Order T-5290-B)
(E75-10056; NASA-CR-140964) Avail: NTIS HC $3.25 CSCL 08B

There are no author-identified significant results in this report.

N75-13357*# Geological Survey, Denver, Colo.
REMOTE SENSING GEOPHYSICS FROM SKYLAB Monthly Report, Jul. 1974
Kenneth Watson, Principal Investigator and H. A. Pohn Jul. 1974 2 p EREP
(NASA Order T-6555-B)
(E75-10057; NASA-CR-140965) Avail: NTIS HC $3.25 CSCL 08E

There are no author-identified significant results in this report.

N75-13358*# Geological Survey, Denver, Colo.
REMOTE SENSING GEOPHYSICS FROM SKYLAB Monthly Report, Aug. 1974
Kenneth Watson, Principal Investigator and H. A. Pohn Aug. 1974 2 p EREP
(NASA Order T-6555-B)
(E75-10058; NASA-CR-140966) Avail: NTIS HC $3.25 CSCL 08E

There are no author-identified significant results in this report.

N75-13359*# Naval Research Lab., Washington, D.C.
TERRAIN PROPERTIES AND TOPOGRAPHY FROM SKYLAB ALTIMETRY Monthly Progress Report, Oct. 1974
Allan Shapiro, Principal Investigator 6 Dec. 1974 1 p EREP
(NASA Order T-4716-B)
(E75-10059; NASA-CR-140999) Avail: NTIS HC $3.25 CSCL 08F

There are no author-identified significant results in this report.

N75-13360*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PRELIMINARY RESULTS IN THE COMPARISON OF SKYLAB, ERTS AND RB-57 IMAGES FOR THE DETECTION OF LINEAMENTS AND FRACTURES IN PRECAMBRIAN, PALEOZOIC, AND LATE TERTIARY ROCKS ON AND NEAR THE COLORADO PLATEAU, NORTH-CENTRAL ARIZONA Progress Report
A. F. H. Goetz, Principal Investigator, William D. DiPaolo, and Donald P. Elston 12 Dec. 1974 7 p EREP
(E75-10060; NASA-CR-141000) Avail: NTIS HC $3.25 CSCL 08G

There are no author-identified significant results in this report.

N75-13361*# Northern Prairie Wildlife Research Center, Jamestown, N. Dak.
UTILIZATION OF SKYLAB (EREP) SYSTEM FOR APPRAISING CHANGES IN CONTINENTAL MIGRATORY BIRD HABITAT Monthly Progress Report, Nov. 1974
David S. Gilmer, Principal Investigator Nov. 1974 2 p EREP
(NASA Order T-4114-B)
(E75-10061; NASA-CR-141001) Avail: NTIS HC $3.25 CSCL 06C

There are no author-identified significant results in this report.

N75-13362*# Agricultural Research Service, Weslaco, Tex.
A STUDY OF THE EARLY DETECTION OF INSECT INFESTATIONS AND DENSITY/DISTRIBUTION OF HOST PLANTS Progress Report, Jun. 1974
William G. Hart, Sammy J. Ingle, and M. R. Davis, Principal Investigators 30 Jun. 1974 2 p EREP
(NASA Order T-4109-B)
(E75-10062; NASA-CR-141002; PR-17) Avail: NTIS HC $3.25 CSCL 08F

The author has identified the following significant results. Significant results have been obtained in the identification of citrus, sugarcane, winter vegetables, irrigated pastures, and unimproved pastures which contain brush. Land without vegetation, lakes, roads, and waterways can also be determined. Different densities of vegetation covering some cultivated areas are apparent. The practical applications of these results are many. The abundance of host plants of pests can be determined. Avenues of entry of pests can be plotted, facilitating control or preventing entry of pest species. The boundaries of areas to be guarantined can be accurately established after viewing the S-190B data. Better cultural methods can be employed such as planning where to plant certain crops that indirectly are detrimental to those already growing. This would relate to such factors as pesticide drift or alternate hosts of major pests.

N75-13363*# North Carolina State Univ., Raleigh. School of Physical and Mathematical Sciences.
UTILIZATION OF EREP DATA IN GEOLOGICAL EVALUATION REGIONAL PLANNING, FOREST MANAGEMENT, AND WATER MANAGEMENT IN NORTH CAROLINA Quarterly Progress Report, Sep. - Nov. 1974
Charles W. Welby, Principal Investigator 13 Dec. 1974 3 p EREP
(Contract NAS9-13321)
(E75-10063; NASA-CR-141003) Avail: NTIS HC $3.25 CSCL 08B

There are no author-identified significant results in this report.

N75-13364*# Battelle Columbus Labs., Ohio.
CALIBRATION AND EVALUATION OF SKYLAB ALTIMETRY FOR GEODETIC DETERMINATION OF THE GEOID Progress Report, 1 Sep. - 30 Nov. 1974
A. G. Mourad, Principal Investigator, S. Gopalapillai, and M. Kuhner 12 Dec. 1974 18 p EREP
(Contract NAS9-13276)
(E75-10064; NASA-CR-141004; PR-19) Avail: NTIS HC $3.25 CSCL 08E

There are no author-identified significant results in this report.

N75-13365*# Corps of Engineers, Waltham, Mass.
NEW ENGLAND RESERVOIR MANAGEMENT Quarterly Progress Report, 23 Jul. - 23 Oct. 1974
Saul Cooper and Duwayne Anderson, Principal Investigators (CRREL) 23 Oct. 1974 4 p EREP
(NASA Order T-4646-B)
(E75-10065; NASA-CR-141005) Avail: NTIS HC $3.25 CSCL 08H

There are no author-identified significant results in this report.

N75-13366*# Purdue Univ., Lafayette, Ind. Lab. for Application of Remote Sensing.
SPECTRORADIOMETRIC AND MULTISPECTRAL SCANNER OVER LAKE MONROE Monthly Report, Oct. 1974
LeRoy F. Silva, Principal Investigator Oct. 1974 2 p EREP
(Contract NAS9-13301)
(E75-10066; NASA-CR-141006) Avail: NTIS HC $3.25 CSCL 08H

There are no author-identified significant results in this report.

N75-13367*# Scientific Translation Service, Santa Barbara, Calif.
FROM AEROSPACE PHOTOGRAPHS TO FORECASTING AND CALCULATING FLOWS
G. P. Kalinin Washington NASA Dec. 1974 63 p refs Transl. into ENGLISH from the book "Ot Aerokosmicheskikh Snimkov k Prognozam: Raschetam Stoka" Leningrad, Hydrometeorological Press, 1974 p 1-41
(Contract NASw-2483)
(NASA-TT-F-16006) Avail: NTIS HC $4.25 CSCL 08E

A theoretical basis is provided for using hydrological data obtained by remote measurements (from spacecraft and aircraft). Methods of calculating flow and the characteristics of the snow cover are suggested, based on photographs that characterize the dynamics of the hydrological processes that occur on the surfaces of river basins. Problems are posed of experimental investigations leading to new possibilities of analysis and calculation of a number of hydrological elements. Author

N75-13368*# Scientific Translation Service, Santa Barbara, Calif.
THE PLANET'S SOIL RESOURCES
V. A. Kovda Washington NASA Dec. 1974 32 p refs Transl. into ENGLISH from Priroda (Moscow), no. 8, 1974 p 2-12
(Contract NASw-2483)
(NASA-TT-F-16008) Avail: NTIS HC $3.75 CSCL 08G

The utilization of the soil as a limited resource of the biosphere is discussed. Topics examined include: soil cover, current soil resources, contamination and geochemical anomalies, soil regeneration, melioration, irrigation and secondary salting, and biogeochemical cycle. F.O.S.

N75-13369# Council for Scientific and Industrial Research, Pretoria (South Africa).
[RESEARCH IN EARTH RESOURCES UTILIZATION, PHYSICAL ENGINEERING, AND POLLUTION] Annual Report, 1973
1974 87 p refs
(AR-29) Avail: NTIS HC $4.75

The 1973 retrospective account of the various cooperative research activities provides photographs and descriptions of advancements in the following fields: (1) chemistry and physics; (2) geomagnetism; (3) astronomy; (4) telecommunications; (5) mechanical and electrical engineering; (6) water and food research; (7) air pollution; (8) road and building technology; and (9) timber and textile research. The information systems that were designed to disseminate the data gained from the research are also described. A.A.D.

N75-13370*# National Aeronautics and Space Administration, Washington, D.C.
ERTS-B (EARTH RESOURCES TECHNOLOGY SATELLITE)
14 Jan. 1975 74 p
(NASA-News-Release-74-329) Avail: NASA Scientific and Technical Information Facility, P. O. Box 33, College Park, Md. 20740 CSCL 05B

Mission plans and objectives of the ERTS 2 Satellite are presented. ERTS 2 follow-on investigations in various scientific disciplines including agriculture, meteorology, land-use, geology, water resources, oceanography, and environment are discussed. Spacecraft design and its sensors are described along with the Delta launch vehicle and launch operations. Applications identified from ERTS 1 investigations are summarized. J.M.S.

N75-13371*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE ERTS-1 INVESTIGATION (ER-600). VOLUME 2: ERTS-1 COASTAL/ESTUARINE ANALYSIS Report for period Jul. 1972 - Jun. 1973
R. Bryan Erb Jul. 1974 286 p refs Original contains color illustrations
(NASA-TM-X-58118; JSC-08457) Avail: NTIS HC $8.75 CSCL 08J

The Coastal Analysis Team of the Johnson Space Center conducted a 1-year investigation of ERTS-1 MSS data to determine its usefulness in coastal zone management. Galveston Bay, Texas, was the study area for evaluating both conventional image interpretation and computer-aided techniques. There was limited success in detecting, identifying and measuring areal extent of water bodies, turbidity zones, phytoplankton blooms, salt marshes, grasslands, swamps, and low wetlands using image interpretation techniques. Computer-aided techniques were generally successful in identifying these features. Aerial measurement of salt marshes accuracies ranged from 89 to 99 percent. Overall classification accuracy of all study sites was 89 percent for Level 1 and 75 percent for Level 2. Author

N75-13372*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
COMPUTER AND PHOTOGRAMMETRIC GENERAL LAND USE STUDY OF CENTRAL NORTH ALABAMA
R. R. Jayroe, P. A. Larsen, and C. W. Campbell Washington Oct. 1974 114 p refs Original contains color illustrations
(NASA-TR-R-431; M-130) Avail: NTIS HC $5.25 CSCL 08B

The object of this report is to acquaint potential users with two computer programs, developed at NASA, Marshall Space Flight Center. They were used in producing a land use survey and maps of central north Alabama from Earth Resources Technology Satellite (ERTS) digital data. The report describes in detail the thought processes and analysis procedures used from the initiation of the land use study to its completion, as well as a photogrammetric study that was used in conjunction with the computer analysis to produce similar land use maps. The results of the land use demonstration indicate that, with respect to computer time and cost, such a study may be economically and realistically feasible on a statewide basis. Author

N75-13373# Earth Satellite Corp., Washington, D.C.
THE ERTS COST-BENEFIT STUDY Quarterly Report, Feb. - Apr. 1974
May 1974 44 p
(Contract DI-14-08-0001-13519)
(PB-234065/1; USGS-DO-74-010; QR-5) Avail: NTIS HC $3.75 CSCL 08F

The report makes an assessment of potential benefits in marine resources management and analytical work for the case studies in land use, forestry and environmental monitoring. Interim case study reports were drafted, mission profiles for case studies to be used in developing alternative system costs and analyzing cloud cover were developed. GRA

N75-13374# Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
NEGATIVELY BUOYANT JETS IN A CROSS FLOW Environmental Protection Technology Series
Jerry Lee Anderson, Frank L. Parker, and Barry A. Benedict Oct. 1973 225 p refs
(Grant EPA-R-800613)
(PB-234177/4; W74-10200; EPA-660/2-73-012) Avail: NTIS MF $2.25; SOD HC $2.50 CSCL 08H

Modification of Fan's and Abrahams jet diffusion models were used to predict the trajectory and dilution of a negatively buoyant jet. Such jets can occur when a chemical waste is discharged into a less dense ambient water or when cool, hypolimnetic water is used for condenser cooling water and discharged into less dense surface waters, then a sinking jet would result. Experimental investigations were conducted involving different combinations of densimetric Froude number, velocity ratio, and initial angle of discharge. Salt was used as the tracer, yielding a fluid that was denser than the ambient receiving water and facilitated measuring concentration profiles of the jet plume. The experimental data was then fitted with predicted jet dilution, trajectory, and cross sectional values for each model. GRA

N75-13375# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
AUTOMATED SELECTION AND LOCATION OF TERRAIN FEATURES ON THE BASIS OF SPECTRAL CHARACTERISTICS
Albert N. Williamson, Jr. 26 Aug. 1974 16 p
(AD-785698) Avail: NTIS CSCL 08/2

The report details data processing methods for converting multispectral scanner images, transmitted from a satellite, by application of computer techniques. GRA

N75-13376# Defense Mapping Agency Aerospace Center, St. Louis, Mo. Technical Translation Section.
SOME QUESTIONS OF GLACIO-ISOSTASY
A. F. Grachev Apr. 1974 13 p refs Transl. into ENGLISH from the book "Izostaziya (Isostasy)" Moscow, 1973 p 152-157
(AD-780669/8; DMAAC-TC-2019) Avail: NTIS HC $3.25 CSCL 08/7

The process of glacio-isostatic movements of the earth's crust is discussed. Canada was an ideal area for such an analysis. The post-glacial uplift of the Canadian shield occurred against the background of the eustatic rise of the world ocean's level, caused by melting of ice sheets. This made it necessary to introduce a corresponding correction in order to obtain a clear structural expression of the process of uplift. Charts depicting various facets of this post glacial uplift are shown.
Author (GRA)

44 ENERGY PRODUCTION AND CONVERSION

Includes specific endrgy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N75-13377+ RAND Corp., Santa Monica, Calif.
PHENOMENOLOGY OF LNG ACCIDENTS: A SELECTED BIBLIOGRAPHY
Ines Siscoe Sep. 1974 15 p refs
(P-5295) Avail: NTIS HC $3.25

A bibliography is presented of reports concerning the chemical, physical, and environmental aspects of liquefied natural gas. Approximately 168 references are listed. F.O.S.

N75-13378 Florida Univ., Gainesville.
ENERGY REQUIRED TO DEVELOP POWER IN THE UNITED STATES Ph.D. Thesis
Pong Nen Lem 1973 213 p
Avail: Univ. Microfilms Order No. 74-19165

Overview models were developed to aid in examining some of the critical issues of the energy systems in the United States. These simplified models provide a general perspective by considering concepts such as energy quality, feedback in energy systems, and net power. Data on energy resources, economic considerations, and environmental interactions were organized according to the issues in a manner useful in more detailed models, and were used in the examples developed. Several models were simulated on an analog computer, showing the development of complexity in the overview models using data for the United States. The extent to which nuclear power is subsidized is calculated using an energy basis for the measurement. The true cost is not yet assessed due to uncertainties in radioactive waste storage and major accidents. Dissert. Abstr.

N75-13379# Committee on Science and Astronautics (U. S. House).
SOLAR PHOTOVOLTAIC ENERGY
Washington GPO 1974 180 p refs Hearings before Subcomm. on Energy of Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., No. 43, 6 and 11 Jun. 1974
(GPO-39-576) Avail: Subcomm. on Energy

The direct conversion of solar energy into electricity by photovoltaic devices was explained to Congress as part of a continuing series of hearings on ways to utilize the sun's energy. The capabilities of solar photovoltaic cells are discussed, along with certain identified problem areas, energy storage capacity, and estimated costs. Some of the broad applications of photovoltaic energy conversion for both domestic and industrial purposes are suggested. The various options for the development, production, implementation, and operation of photovoltaic systems that produce electricity and hydrogen fuel gas from solar energy are considered, and the estimated future costs of producing electricity using such systems are compared with those of conventional systems that use fossil and nuclear fuels. A.A.D.

N75-13380*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
WIND ENERGY DEVELOPMENTS IN THE 20TH CENTURY
Donald J. Vargo 1974 29 p refs Presented at 4th Ann. Regulatory Inform. Systems Conf., St. Louis, 10-12 Sep. 1974
(NASA-TM-X-71634; E-8172) Avail: NTIS HC $3.75 CSCL 10A

Wind turbine systems of the past are reviewed and wind energy is reexamined as a future source of power. Various phases and objectives of the Wind Energy Program are discussed. Conclusions indicate that wind generated energy must be considered economically competitive with other power production methods. J.M.S.

N75-13381*# Auburn Univ., Ala. School of Engineering.
MEGASTAR: THE MEANING OF GROWTH. AN ASSESSMENT OF SYSTEMS, TECHNOLOGIES, AND REQUIREMENTS Final Report
Sep. 1974 594 p refs
(Grant NGT-01-003-004)
(NASA-CR-120338) Avail: NTIS HC $13.25 CSCL 10A

A methodology for the display and analysis of postulated energy futures for the United States is presented. A systems approach methodology including the methodology of technology assessment is used to examine three energy scenarios--the Westinghouse Nuclear Electric Economy, the Ford Technical Fix Base Case and a MEGASTAR generated Alternate to the Ford Technical Fix Base Case. The three scenarios represent different paths of energy consumption from the present to the year 2000. Associated with these paths are various mixes of fuels, conversion, distribution, conservation and end-use technologies. MEGASTAR presents the estimated times and unit requirements to supply the fuels, conversion and distribution systems for the postulated end uses for the three scenarios and then estimates the aggregate manpower, materials, and capital requirements needed to develop the energy system described by the particular scenario. Author

N75-13382*# Kanner (Leo) Associates, Redwood City, Calif.
UTILIZATION OF SOLAR ENERGY
I. Oshida Washington NASA Dec. 1974 23 p refs Transl. into ENGLISH from Kagaku (Japan), v. 43, no. 11, Nov. 1973 p 658-663
(Contract NASw-2481)
(NASA-TT-F-16090) Avail: NTIS HC $3.25 CSCL 10A

Comments are presented on an international conference concerned with solar energy utilization. The difficulties of harnessing solar energy are outlined in terms of three basic properties: (1) high dilution, (2) intermittent nature, and (3) high entropy. The current state and future prospects of utilization of solar energy in various forms are discussed. Author

N75-13383*# Kanner (Leo) Associates, Redwood City, Calif.
SOLAR POWER GENERATING SYSTEMS AS SOURCES OF NON-POLLUTING ENERGY (POWER GENERATION IN SPACE AND POWER GENERATION ON THE GROUND)
Tatsuo Tani and Takashi Horigome Washington NASA Dec. 1974 14 p refs Transl. into ENGLISH from J. Inst. Elec. Eng. Jap. (Japan), v. 92, no. 12, Dec. 1972 p 31-24
(Contract NASw-2481)
(NASA-TT-F-16091) Avail: NTIS HC $3.25 CSCL 10A

Various systems of solar power generation in space and on the ground which have been made public thus far are considered. In connection with the proposed American system for building solar power stations in space, the composition of the solar power stations and the microwave power transmission system, the efficiency of the microwave power transmission system, the method of delivering the power stations into orbit in space, and other related matters are discussed. Two systems for solar thermal power stations on the ground are outlined. The first is the system proposed by a group at the University of Arizona, and the second is one using an MHD generator. Research and development ought to be commenced immediately concerning solar thermal power generating systems on the ground. Author

N75-13384*# Kanner (Leo) Associates, Redwood City, Calif.
WIND POWER PROJECTS OF THE FRENCH ELECTRICAL AUTHORITY
R. Bonnefille Washington NASA Dec. 1974 61 p refs Transl. into ENGLISH of "Les Realisations d Electricite de France Concernant l Energie Eolienne", Rept. F40/74, no. 4. Electricite de France, Direction des Etudes et Recherches, Service Generateurs et Echangeurs de Chaleur Thermiques et Nucleaires, Apr. 1974 p 1-45
(Contract NASw-2481)
(NASA-TT-F-16057) Avail: NTIS HC $4.25 CSCL 10B

Systematic measurement of the wind power distribution in France has shown that the design of wind generators involves two basic problems: the irregularity of the energy supply and the mechanical strength of the assembly. Since these problems have largely been solved for generators less than 10 kW, the main body of this discussion deals with practical tests on one

average-power and two high-power generators. Other variants tested in France and other countries are described in less detail. Further development of average-power generators with an output on the order of 100 kW is recommended. Author

N75-13385*# Kanner (Leo) Associates, Redwood City, Calif.
EXPLOITING WIND POWER FOR THE PRODUCTION OF ELECTRICITY
M. Johansson Washington NASA Dec. 1974 55 p refs Transl. into ENGLISH from the Danish report TR-152
(Contract NASw-2481)
(NASA-TT-F-16058; TR-152) Avail: NTIS HC $4.25 CSCL 10A

The economic, energy-economic, and environmental issues involved in any prospective exploitation of wind power intended to cover a minor part (10%) of Denmark's consumption of electricity are discussed. The chief basis for the calculations involved is the 200 kW experimental windmill built at Gedser in 1956-57, which ceased to produce electricity in 1967. However, in exploring the ramifications of making Denmark partially dependent on wind energy power, estimates are made on the basis of projected larger series of mills of the Gedser type. Wind mill projects abroad, such as at Vattenfall, NSF and NASA, are also discussed, as is Denmark's dependence on power from Sweden and Germany. Author

N75-13386*# Scientific Translation Service, Santa Barbara, Calif.
A SYSTEM UTILIZING SOLAR ENERGY
Washington NASA Dec. 1974 8 p Transl. into ENGLISH from Densoken Nyusu (Japan), no. 284, Sep. 1973 p 1-3
(Contract NASw-2483)
(NASA-TT-F-16089) Avail: NTIS HC $3.25 CSCL 10A

The possibilities of using solar energy as a future energy source are discussed. A system utilizing solar energy is described and discussed. The factors necessary for a solar energy system are listed. Author

N75-13387# Committee on Science and Astronautics (U. S. House).
WIND ENERGY
Washington GPO 1974 393 p refs Hearing before Subcomm. on Energy of Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., No. 49, 21 May 1974
(GPO-37-390) Avail: Subcomm. on Energy

Wind energy as a resource base was investigated in a Congressional hearing whose purpose was to ascertain the amount of power available from wind, the maximum amount recoverable, and the relationship between the maximum amount recoverable and the present capacity of U.S. electric power generating systems. Basic information on the economic factors associated with the generation of energy from wind in commercial quantities is provided. Such concerns as implementation costs, environmental impacts, land use and water requirements, visual and noise effects, social acceptability, and institutional constraints are also discussed, and several demonstration projects are proposed. A.A.D.

N75-13388# RAND Corp., Santa Monica, Calif.
ELECTRICITY CONSERVATION MEASURES IN THE COMMERCIAL SECTOR: THE LOS ANGELES EXPERIENCE
J. P. Acton, M. H. Graubard, and D. J. Weinschrott Sep. 1974 74 p
(Contract FEA-14-01-0001-1715)
(R-1592-FEA) Avail: NTIS HC $4.25

The results are studied of a Los Angeles city ordinance effecting a cutback in electricity consumption. Preliminary statistical analysis indicated a quick reduction in electricity use by consumers in all sectors (commercial, industrial, and residential), with particularly significant drops in commercial consumption. Several commercial establishments were investigated to account for their rapid adjustment, and it was found that: (1) lighting changes accounted for most of the reduced usage, (2) the 20 percent cutback specified by the ordinance did not generally cause severe dislocations, and (3) time and costs involved in implementation were considered relatively small. The adaptation of the residential sector to the constraints is also discussed. Comments on the applicability of the Los Angeles experience to other areas are presented. N.E.R.

N75-13389# Sandia Labs., Livermore, Calif.
PROSPECTS FOR SOLAR ENERGY UTILIZATION
T. D. Brumleve Jun. 1974 11 p Presented at the Calif. Soc. of Profess. Eng., Stateline, Nevada, 13-15 Jun. 1974
(Contract AT(29-1)-789)
(SAND-74-8604; Conf-740639-1) Avail: NTIS HC $3.25

A brief overview of the present status and the prospects for various potential applications of solar energy is presented. A few general observations regarding the nature and utilization of solar energy are offered. Main emphasis is on the direct use of solar radiation in heat engines. NSA

N75-13390# Sandia Labs., Albuquerque, N.Mex.
SOLAR INCIDENCE FACTOR AND OTHER GEOMETRIC CONSIDERATIONS OF SOLAR ENERGY COLLECTION
W. P. Schimmel, Jr. Jul. 1974 22 p
(Contract AT(29-1)-789)
(SAND-74-26) Avail: NTIS HC $3.25

A vector analysis was made of the 5-degree-of-freedom system occurring in a flat plate or focused collector system. The results of this analysis were extended to include the case of an intermediate flat plate reflector. Because the expressions obtained are very general in nature, it is possible to work from local weather bureau data (with an appropriate scale factor to take into account the ratio of specular to total insolation) for a comparison of various proposed collector systems. Armed with these results, systems analysts can begin to optimize candidate systems and evaluate the effect of system constraints, and devote more time to the physics of solar absorption and other system considerations. Author (NSA)

N75-13391# Brookhaven National Lab., Upton, N.Y.
TECHNICAL AND ECONOMIC FEASIBILITY OF SUPERCONDUCTING POWER TRANSMISSION: A CASE STUDY
E. B. Forsyth, G. A. Mulligan, J. W. Beck, and J. A. Williams 8 Feb. 1974 9 p refs Presented at the Power Eng. Soc. Summer Meeting and Energy Resources Conf., Anaheim, Calif., 14 Jul. 1974 Sponsored by AEC
(BNL-18602; Conf-740709-1) Avail: NTIS HC $3.25

The long-range plans of the Long Island Lighting Company include the installation of 4600 MW of generation capacity at nuclear sites on eastern Long Island by the 1990's. A single site, Shoreham, was chosen for this study which would require transmission facilities to the Ruland Road substation, 43 miles away. Conventional 345 kV overhead and underground circuits are planned for this service. For the case study three superconducting cable schemes were investigated which reflect various technical options. The superconducting cables were designed to meet acceptable normal and contingency load flow conditions and to withstand maximum short circuit faults. A cost analysis was made of the complete installation, providing a valuable comparison of the estimated cost of this new technology with conventional methods. The most favorable cost comparison is a two-circuit 345 kV superconducting system, which appears to be about one-half the cost of an all underground 345 kV high pressure oil-filled cable system. Author (NSA)

N75-13392# Sandia Labs., Albuquerque, N.Mex.
SOLAR ENERGY: SANDIA'S PHOTOVOLTAIC RESEARCH PROGRAM
G. A. Samara and D. G. Schueler May 1974 14 p refs
(Contract AT(29-1)-789)
(SLA-74-281) Avail: NTIS HC $3.25

A brief description is given of Sandia Laboratories on-going and planned activities in photovoltaic solar energy conversion. The scope of the program, its overall objectives and expected accomplishments are outlined. Author (NSA)

N75-13393# Teledyne Isotopes, Timonium, Md. Energy Systems Div.
ECONOMIC RADIOISOTOPE THERMOELECTRIC GENERATOR PROGRAM: PROGRAM PLAN
Nov. 1973 149 p refs
(Contract SNSO-3)
(IESD-3112-3) Avail: NTIS HC $5.75

This program plan describes the effort required to develop, test, and manufacture the 400 W(e) economic radioisotope

thermoelectric generator (ERTG) for space applications. The initial program is described in IESD-3112-1. NSA

N75-13394# Teledyne Isotopes, Timonium, Md. Energy Systems Div.
ECONOMIC RADIOISOTOPE THERMOELECTRIC GENERATOR STUDY PROGRAM: COST EFFECTIVENESS STUDY
Nov. 1973 57 p refs
(Contract SNSO-3)
(IESD-3112-4) Avail: NTIS HC $4.25

The recently completed economic radioisotope thermoelectric generator (ERTG) study, and its resulting design definition were greatly dependent on a parallel cost effectiveness study and the results of numerous cost trade-offs. Both the total program activity and the ERTG design have been cost optimized. NSA

N75-13395# California Univ., Livermore. Lawrence Livermore Lab.
RIO BLANCO: NUCLEAR OPERATIONS AND CHIMNEY REENTRY
W. R. Woodruff and R. S. Guido 15 May 1974 99 p refs
(Contract W-7405-eng-48)
(UCRL-51560) Avail: NTIS HC $4.75

Rio Blanco was the third experiment in the AEC's Plowshare Program to develop technology to stimulate gas production from geologic formations not conducive to production by conventional means. Three nuclear explosives, specifically designed for this application, were detonated simultaneously in a minimum-diameter emplacement well using many commercially available, but established-reliability components. The explosive system performed properly under extreme temperature and pressure conditions. Emplacement and stemming operations were designed with the aim of simplifying both the emplacement and reentry and fully containing the detonation products. An integrated command and control system was used with communication to all three explosives through a single coaxial cable. Reentry and the initial production testing were completed. To date 98 million standard cu ft of chimney gas were produced. Author (NSA)

N75-13396# National Academy of Engineering, Washington, D.C.
EVALUATION OF COAL-GASIFICATION TECHNOLOGY. PART 1: PIPELINE-W QUALITY GAS Interim Report
Apr. 1973 92 p refs
(Contract DI-14-32-0001-1216)
(PB-234036/2; OCR-74-INT-1) Avail: NTIS HC $2.25; SOD HC $0.70 as SD2414-00057 CSCL 07A

The discussion of coal gasification for production of pipeline gas includes information on the natural gas shortage, and projected needs, cost estimates (capitalized and operating), and specific problems of eight gasification processes. GRA

N75-13397# Monsanto Research Corp., Dayton, Ohio.
EFFECT OF GAS TURBINE EFFICIENCY AND FUEL COST ON COST OF PRODUCING ELECTRIC POWER Final Report
William H. Hedley May 1974 32 p refs
(Contract EPA-68-02-1320)
(PB-234159/2; MRC-DA-434; EPA-650/2-74-041) Avail: NTIS HC $3.75 CSCL 10A

It is shown that combining gas and steam turbines (COGAS systems) can increase overall power generation efficiency at costs of 6 to 10 mills per kWh as a function of fuel costs of 40 to 100 cents per million Btu. Such a capability will improve gas turbine efficiency by 29 percent to 37 percent over the next 9 years, and in turn will result in combined cycle efficiencies of 42 percent to 54 percent. GRA

N75-13398# Monsanto Research Corp., Dayton, Ohio.
EFFICIENCIES IN POWER GENERATION Final Report, Nov. 1973 - Feb. 1974
T. R. Blackwood and W. H. Hedley Mar. 1974 48 p refs
(Contract EPA-68-02-1320)
(PB-234160/0; MRC-DA-404; EPA-650/2-74-021) Avail: NTIS HC $3.75 CSCL 10A

Twenty-three different ways of using or converting energy. A tabular comparison of the thermodynamic limiting present and future (1990) efficiencies are provided. A brief discussion was given on efficiency limiting factors, possible general routes for process improvement, and relevant on-going research and development. The report concludes that more study is required in several of the following areas: atmospheric fluidbed combustion, automotive, bottoming cycle, chemical coal cleaning systems, chemically active fluid-bed combustion, coal cleaning plants, coal liquefaction, combined cycle (gas and steam), conventional boilers, conventional boilers plus flue gas cleaning, conversion of coal to methanol, diesel, Feher cycle, fuel cells, gas turbine, and various other related areas. Author (GRA)

N75-13399# Bureau of Mines, Laramie, Wyo. Energy Research Center.
RETORTING INDEXES FOR OIL-SHALE PYROLYSES FROM ETHYLENE-ETHANE RATIOS OF PRODUCT GASES
I. A. Jacobson, Jr., A. W. Decora, and G. L. Cook Jun. 1974 27 p refs
(PB-234050/3; BM-RI-7921) Avail: NTIS HC $3.75 CSCL 07A

In a closely controlled laboratory retorting system for oil shale, a relationship was developed between the temperature in the retort and the weight ratio of ethylene to ethane in the gases produced. Reciprocal temperature was shown to be directly proportional to the log (Ethylene)/(Ethane). From this relationship a number, called retorting index, was developed. It has the dimension of temperature, but its magnitude depends on both temperature and residence time for the reactants in the heated zone in the oil shale retort. The slopes of the lines relating reciprocal temperature and the logarithm of the ethylene-ethane ratios are nearly constant for each of the retorting processes for which data have been presented. GRA

N75-13400# British Steel Corp., Sheffield (England). Information Services.
THE GASIFICATION OF COAL: A BIBLIOGRAPHY
D. G. Brinn Jun. 1974 15 p
(PB-234294/7; SM/BIB/409/1) Avail: NTIS HC $3.25

The bibliography consists of some 60 annotated references from the literature mainly within the period 1970-1973. The processes considered are: Winkler; Winkler-Flesch; Lurgi; Bi-Gas; Koppers Totzek; Hygas; CO2 Acceptor; Atgas; Kellogg; Synthane; Westinghouse; Cogas; Stone and Webster; and Hydrane. GRA

N75-13401# Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.
CLEAN POWER GENERATION FROM COAL Final Report, 30 Jun. 1972 - 23 Jan. 1973
May 1974 337 p refs
(Contract DI-14-32-0001-1223)
(PB-234188/1; OCR-84) Avail: NTIS; SOD HC $3.30 CSCL 10B

The tasks which were contained within the research which was directed towards the attainment of clean power generation from coal are the following: (1) identification of most promising power plant concepts using coal; (2) fuel cell battery development; (3) turbine development; (4) particulate removal from high temperature, high pressure gases; and (5) development of a low cost solid electrolyte hydrogen production process. Progress on the determination of 1990 environmental conditions of power plants and electric utility steam coal prices in the period 1970 to 1985 is discussed, along with regional forecasts of electric utility industry generation requirements to 1985 and forecasts of electric utility industry generation requirements to 1990. A subroutine is described for induced or natural draft cooling tower performance, cooling tower cost, and So2 stack gas scrubbing equipment. GRA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N75-13402 California Inst. of Tech., Pasadena.
MATHEMATICAL MODELING OF PHOTOCHEMICAL AIR POLLUTION Ph.D. Thesis

Steven Diggs Reynolds 1974 491 p
Avail: Univ. Microfilms Order No. 74-24452

A model is presented for predicting the dynamic behavior of both inert and chemically reacting air pollutants in an urban atmosphere. Pollutants studied included carbon monoxide, nitric oxide, nitrogen dioxide, ozone, and hydrocarbons. The model was developed for a general urban area and then applied to the Los Angeles airshed. The governing equations of the model are based on the general mass conservation relationships for a chemically reactive species in a three-dimensional, turbulent atmospheric boundary layer. The treatment of the winds and temperature inversion in the Los Angeles area is described. It was found that the model predicts pollutant concentrations reasonably well considering the complexity of the problem and the uncertainty in many of the parameters. Future applications of the model are discussed, including the short range forecast of pollutant concentrations and the evaluation of the impact of regional planning decisions and emission control strategies on air quality. Dissert. Abstr.

N75-13403 California Univ., Los Angeles.
AIR POLLUTION CONTROL IN CALIFORNIA FROM 1970 - 1974: SOME COMMENTS ON THE IMPLEMENTATION PLANNING PROCESS Ph.D. Thesis
Eugene Yee Leong 1974 196 p
Avail: Univ. Microfilms Order No. 74-22982

A review is presented of the air pollution control activities which have taken place in California from 1970 to 1974. In particular, considerable emphasis was placed on documenting events surrounding the development of final transportation control plans for California, including Los Angeles. The study presents a critique of certain requirements set forth by the Act; as a result of some of these stringent requirements, questions have been raised concerning the Environmental Protection Agency's handling of the situation. Thus the study retraces the iterative process which has taken place in the evolution of a final transportation control plan. Some of the difficulties encountered by the various agencies involved in the planning process are discussed. Lastly a few recommendations are made as potential remedies to some of the problems which have been encountered. Dissert. Abstr.

N75-13404# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.
CENTRAL AND LOCAL ADMINISTRATIVE FUNCTIONS IN THE FIELD OF WATER POLLUTION
Giorgio Cortellessa 30 Dec. 1973 20 p In ITALIAN; ENGLISH summary
(ISS-T-73/14) Avail: NTIS HC $3.25

Problems in the administration of regulations concerning water pollution management are discussed. Emphasis is placed on the functions of the Ministry of Public Works and Sanitation, functions of the central technical section, and regional functions. An organizational structure is suggested for a separate unified National Center for pollution prevention. Transl. by F.O.S.

N75-13405*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A SIMULATION MODEL FOR STUDYING EFFECTS OF POLLUTION AND FRESHWATER INFLOW ON SECONDARY PRODUCTIVITY IN AN ECOSYSTEM Ph.D. Thesis - North Carolina State Univ.
Robert Ward Johnson 1974 123 p refs
(NASA-TM-X-72169) Avail: NTIS HC $5.25 CSCL 13B

A mathematical model of an ecosystem is developed. Secondary productivity is evaluated in terms of man related and controllable factors. Information from an existing physical parameters model is used as well as pertinent biological measurements. Predictive information of value to estuarine management is presented. Biological, chemical, and physical parameters measured in order to develop models of ecosystems are identified. Author

N75-13406*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DOWNWIND HAZARD CALCULATIONS FOR SPACE SHUTTLE LAUNCHES AT KENNEDY SPACE CENTER AND VANDENBERG AIR FORCE BASE
Michael Susko, C. Kelly Hill, and John W. Kaufman Washington Dec. 1974 68 p refs
(NASA-TM-X-3162; M-126) Avail: NTIS HC $4.25 CSCL 13B

The quantitative estimates are presented of pollutant concentrations associated with the emission of the major combustion products (HCl, CO, and Al2O3) to the lower atmosphere during normal launches of the space shuttle. The NASA/MSFC Multilayer Diffusion Model was used to obtain these calculations. Results are presented for nine sets of typical meteorological conditions at Kennedy Space Center, including fall, spring, and a sea-breeze condition, and six sets at Vandenberg AFB. In none of the selected typical meteorological regimes studied was a 10-min limit of 4 ppm exceeded. Author

N75-13407# Argonne National Lab., Ill.
AIRPORT VICINITY AIR POLLUTION STUDY Final Report
D. M. Rote, R. W. Hecht, I. T. Wang, R. R. Cirillo, L. E. Wangen, and J. Pratapas Dec. 1973 295 p refs Sponsored in part by AEC
(Contract DOT-FA71WAI-223)
(AD-780049; FAA-RD-73-113) Avail: NTIS HC $6.75

The development is described of a computer model that can be used to determine the impact of an existing or planned airport on the air quality in its vicinity. The model development was supported by an air quality monitoring and emission activity data acquisition program. O'Hare International Airport, Chicago, Illinois, and Orange County Airport, Los Angeles, California were selected as test sites, each being representative of a predominantly commercial airport and a predominantly general aviation airport, respectively. The activity simulation and air quality model are discussed. Results of the computations of air quality concentrations and comparisons with observations are presented. Author

N75-13408# California Univ., Livermore. Lawrence Livermore Lab.
INTERAGENCY CONFERENCE ON THE ENVIRONMENT: A POST-CONFERENCE SURVEY
G. D. Sauter and C. F. Miller 11 Jun. 1974 16 p refs Conf. held at Livermore, Calif., Oct. 1972
(Contract W-7405-eng-48)
(UCRL-51588) Avail: NTIS HC $3.75

The Interagency Conference on the Environment, held at LLL in October 1972, brought together nearly 200 representatives of the U. S. Environmental Protection Agency (EPA), the Atomic Energy Commission (AEC), the National Aeronautics and Space Administration (NASA), and the various AEC and NASA laboratories. It was held to promote an effective exchange of ideas and information on environmental research and to explore ways in which the capabilities and facilities of these laboratories might be more effectively used to complement and supplement existing EPA environmental research programs. Some months after the conference, many of the participants were interviewed to determine the effectiveness and the impact of the conference. This survey indicated that, although only a few specific research projects resulted from it, the conference was considered very successful as a medium of information exchange. Author (NSA)

N75-13409# Oak Ridge National Lab., Tenn.
PROCEEDINGS OF THE FIRST ANNUAL NSF TRACE CONTAMINANTS CONFERENCE
W. Fulkerson, comp., W. D. Shults, comp., and R. I. VanHook, comp. Mar. 1974 775 p refs Presented at the 1st Ann. NSF Trace Contaminants Conf., Oak Ridge, Tenn., 8-10 Aug. 1973
(Conf-730802) Avail: NTIS HC $15.25

Papers presented are grouped under the following topics: environmental contamination by lead, modeling transport and biological translocation, measurement of sources and environmental levels, transport and ecosystem modeling, sampling strategy and analytical measurements, ecological and biomedical effects and measurements, measuring environmental distribution and cycling, and implementing the use of results from RANN programs. Separate abstracts were prepared for 3 papers. NSA

N75-13410# Environmental Research and Technology, Inc., Lexington, Mass.
DEVELOPMENT OF PROCEDURES TO SIMULATE MOTOR VEHICLE POLLUTION LEVELS Final Report, Apr. 1972 - May 1973

B. A. Egan, A. Epstein, M. Keefe, J. League, and T. Lavery May 1973 189 p refs Sponsored by Dept. of Highways and Traffic
(PB-233938/0; ERT-P-343-F) Avail: NTIS HC $7.00 CSCL 13B

Procedures to predict motor vehicle air quality concentrations in the vicinity of highways as a function of highway design configuration, traffic characteristics, and meteorological conditions are presented. A numerical simulation, conservation of mass dispersion model for the study of vertical cross-sections of concentrations very near the roadways, and a Gaussian plume diffusion model for plan view, corridor, and regional-scaled analysis were developed. A field measurement program for model evaluation at roadway sites in Washington, D. C. included the measurement of carbon monoxide on both sides of the road, measurements of traffic volumes, speed distributions and vehicle mix, and meteorological measurements of wind speed and direction. The models were validated and the statistical factors quantifying model accuracy were calculated. Modeling capabilities and graphical display programs were implemented on DCDHT computer facilities. The models developed are shown to predict air pollution potential very well over a wide range of input quantities. GRA

N75-13411# California Univ., Berkeley. Dept. of Chemical Engineering.
REMOVAL OF OIL FROM AQUEOUS WASTES BY FLOTATION
Simon L. Goren Jun. 1974 14 p refs Sponsored by Dept. of Interior
(PB-234023/0; OWRR-A-034-CAL(3)) Avail: NTIS HC $3.25 CSCL 07A

The effects of electrolyte type and concentration on the separation of oil in water dispersions was examined experimentally. Flotation appears to be highly effective in removing droplets at high electrolyte concentrations or with aluminum sulfate under basic conditions. The efficiency of removal decreases with decreasing drop size limiting the effectiveness of flotation to the droplets greater than several microns in diameter. GRA

N75-13412# Copley International Corp., la Jolla, Calif.
EFFECTS OF OXIDANT LEVELS ON SELECTED HEALTH CHARACTERISTICS OF PERSONS IN THE LOS ANGELES BASIN. VOLUME 1: DATA COLLECTION Final Report
R. David Flesh 7 Jun. 1974 53 p
(Contract EPA-68-02-0349)
(PB-234337/4; CRC-APRAC-CAPM-11-71-2-Vol-1; AR-2) Avail: NTIS HC $4.25 CSCL 06E

The report presents results of a coordinated series of epidemiologic studies being conducted in the Los Angeles Basin. These studies form a part of the Community Health and Environmental Surveillance System (CHESS) program being conducted in several various sized metropolitan areas across the nation. Selected health characteristics of persons residing in three communities of the Los Angeles Basin were measured. These communities reflected an exposure gradient for ambient oxidant air pollution. Health indicators which were investigated included frequency of acute respiratory illness, ventilatory performance of school children, frequency and severity of asthma attacks in a panel of patients and pollutant burden of trace metals. GRA

N75-13413# GEOMET, Inc., Rockville, Md.
COMPILATION OF WIND INDIRECT SOURCE MONITORING STUDIES Final Report
John T. MacWaters and Douglas J. Pelton Apr. 1974 83 p refs
(Contract EPA-68-02-1094)
(PB-234009/9; GEOMET-EF-316; EPA-450/3-74-043) Avail: NTIS HC $4.75 CSCL 13B

A presentation of abstracts of air quality monitoring studies conducted in vicinity of indirect sources is made. Types of indirect sources include airports, amusement parks, highways, parking lots, shopping centers, recreational areas, sports complexes, commercial and residential developments and parking garages. The purpose of the report is to provide potential sources of information to these agencies or developers having to make an analysis of the impact of a proposed indirect source air quality. GRA

N75-13414# Grumman Aerospace Corp., Bethpage, N.Y.
TREATMENT AND RECOVERY OF FLUORIDE INDUSTRIAL WASTES Environmental Protection Technology Series
Christian J. Staebler Mar. 1974 98 p refs
(Contract EPA-660/2-73-024)
(PB-234447/1; W74-10543; EPA-65-02-73-024) Avail: NTIS MF $2.25; SOD HC $1.40

The development and successful demonstration of laboratory and pilot-scale fluoride treatment techniques for selected aerospace and metal working industry chemical processing solutions and rinse waters are described. Pilot studies of centrifugal techniques to separate lime-precipitated bridges from titanium chemical milling, titanium descaling, and aluminum deoxidizing solutions show that lime precipitation can give final effluents having fluoride concentrations less than three parts per million. Aluminum conversion coating solution, however, require secondary treatment with aluminum sulfate to give final effluents having fluoride concentrations less than three parts per million. GRA

N75-13415# North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
AN ECOLOGICAL SYSTEMS APPROACH TO COMMUNITY NOISE ABATEMENT, PHASE 1 Final Report, Jun. 1973 - May 1974
B. K. Huang Jun. 1974 110 p refs
(Contract DOT-OS-30102)
(PB-234311/9; DOT-OS-30102) Avail: NTIS HC $5.25 CSCL 13B

The study deals with development of a noise-environment-ecological system model. Evaluation has been made on available traffic noise prediction models and simulation programs. Computer graphic techniques have been developed for quantitative identification of environmental noise levels and control. Surveys on noise attenuation characteristics of various plants, such as, trees, shrubs, and grasses have been performed to determine the effects of biological and physical parameters on noise abatement. Significant noise reduction is obtainable by properly selected shrub belts and grasses. Reverberation tests have been conducted to investigate the absorptive reflection and sound scattering by vegetation to incorporate plant growth dynamics related to noise attenuation characteristics. GRA

N75-13416# GCA Corp., Bedford, Mass.
BRAXTON SONIC AGGLOMERATOR EVALUATION Final Report
Richard Dennis, Robert Bradway, and Reed Cass May 1974 81 p refs
(Contract EPA-68-02-1316)
(PB-234146/9; EPA-650/2-74-036) Avail: NTIS HC $4.75 CSCL 07A

An evaluation was made of a novel air pollution control system developed by the Braxton Corporation. The alternating velocity precipitator, or sonic agglomerator, is designed to decrease the number and increase the size of particles in a gas stream by agglomeration induced by a standing sound wave through which the aerosol moves. A prototype alternating velocity precipitator was tested to determine its basic performance characteristics and to evaluate the effect of adding water and/or steam to the systems performance. The particle size distributions of the fine particles at both the inlet and outlet of the sonic agglomerator were determined with Anderson cascade impactors. GRA

N75-13417# Center for California Public Affairs, Claremont.
ENVIRONMENTAL IMPACT REQUIREMENTS IN THE STATES: NEPA'S OFFSPRING Socioeconomic Environmental Studies Series
Thaddeus C. Trzyna Apr. 1974 87 p refs
(Contract EPA-68-01-1818)
(PB-234384/6; W-74-10527; EPA-600/5-74-006) Avail: NTIS; SOD HC $1.30 as EP1.23:600/5-74-006 CSCL 13B

There is a growing trend in the states to adopt requirements for environmental impact statements like those in the National Environmental Policy Act of 1969. Fifteen states and Puerto Rico now require impact statements for a wide range of

activities significantly affecting the quality of the environment, and several others apply the process to limited classes of projects. At least twenty other states have such requirements under consideration. The state requirements are summarized and compared to each other and to the national act. Some key issues are discussed: contents of the impact statement, applicability to private projects and local governments, relation to land use regulation, enforcement, and citizen participation.
GRA

N75-13418# Bureau of Mines, Pittsburgh, Pa.
COMBUSTION CONTROL OF POLLUTANTS FROM MULTI-BURNER COAL-FIRED SYSTEMS Final Report
C. R. McCann, J. J. Demeter, R. B. Snedden, and D. Bienstock May 1974 43 p
(PB-233037/1; EPA-650/2-74-038) Avail: NTIS HC $3.75

An experimental 500 1b/hr multi-burner pulverized-coal fired furnace was utilized to determine the effects of several combustion modifications on nitrogen oxides emissions. Techniques investigated were reduced excess air, staged combustion, flue gas recirculation to both primary and secondary combustion air streams, and combinations of all techniques. (Modified author abstract)
GRA

N75-13419# Air Force Avionics Lab., Wright-Patterson AFB, Ohio.
AN APPLICATION OF INFRARED REMOTE SENSING TECHNIQUES TO ECOLOGICAL PROBLEMS
L. W. Crouch and R. D. Mower Jul. 1974 48 p
(AD-786028; AFAL-TR-74-98) Avail: NTIS CSCL 13/2

The report and compendium of aerial infrared imagery was extracted from an R and D laboratory test of an Air Force infrared scanner. The purpose of the R and D test was to demonstrate the ability of one Air Force scanner to display thermal differentials found in a ground scene. The flight test area included a series of waterways and contiguous shorelines which illustrate ecological thermal phenomena. Specific examples of imagery were extracted from the R and D test program data for inclusion in this report. A summary of pertinent infrared technology is presented which relates sensor performance to atmospheric conditions, target and background characteristics, as well as image information content. In addition, brief photographic interpretation comments are included for each infrared image.
Author (GRA)

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation*.

N75-13420 Denver Univ., Colo.
RAY METHOD EXPANSIONS AND NUMERICAL CALCULATIONS FOR ATMOSPHERIC MOUNTAIN LEE WAVES Ph.D. Thesis
Chai-Ho Charles Wang 1974 203 p
Avail: Univ. Microfilms Order No. 74-24672

A ray method formalism was developed for the analysis of atmospheric waves in the lee of mountains. Gravity waves of small amplitude in a basic current where the Brunt-Vaisala frequency and horizontal velocity vary with height, were studied. The steady state solution is obtained as transverse propagation of modes so that the dispersion relation arises as an eigen-condition on an eigenvalue problem involving an ordinary differential equation in the altitude variable. The transient solution is obtained in terms of three dimensional propagation with reflections from boundary surfaces, making the dispersion relation an eigen-condition on an algebraic eigenvalue problem. In each case the deduced equation for amplitude propagation assumes the form of conservation of action. Initial conditions on rays are provided by canonical problems of constant coefficients which are solved via Fourier transform techniques. Numerical schemes are implemented to integrate the ray equations and calculate the solution.
Dissert. Abstr.

N75-13421 New Mexico State Univ., University Park.
DETERMINATION OF AIR TEMPERATURE IN THE UPPER ATMOSPHERE WITH MULTIPLE SENSOR THERMOMETRY Ph.D. Thesis
Carlos McDonald 1974 248 p
Avail: Univ. Microfilms Order No. 74-23630

Multiple sensor thermometry has proven to be a feasible and relatively economical rocket probe technique for extending immersion thermometry soundings of kinetic air temperature in the upper atmosphere from 60 to over 100 km. In order to demonstrate the feasibility of this technique, a dual hot wire temperature probe was designed, laboratory tested, and flown to obtain air temperature data up to 64 km. This data was compared with that of a thermistor probe which is currently utilized to obtain diurnal and synoptic kinetic temperature soundings in the upper atmosphere. Based on the analysis of the temperature profiles obtained from both the dual hot wire and thermistor probes, theoretical studies, and laboratory experiments, it was concluded that the dual hot wire temperature probe may be used to determine the kinetic air temperature to 100 km within + or - 0.8K, and to about 140 km within + or - 5K.
Dissert. Abstr.

N75-13422 Wisconsin Univ., Madison.
LARGE-SCALE LOWER TROPOSPHERIC CIRCULATION CHANGE, 1951-1970 Ph.D. Thesis
Bruce F. Berryman 1974 117 p
Avail: Univ. Microfilms Order No. 74-19322

The areal extent and form of seasonal circulation changes accompanying the climatic changes observed between the early 1940's and the early 1960's were studied. Techniques included averaging and differencing of annual and seasonal height fields, and objective and subjective comparison of average properties of coefficients of the Fourier-Bessel representation of the daily height fields. Possible data imhomogeneities were also investigated. Changes from the 1950's to the 1960's included: (1) increased frequency of a circulation pattern exhibiting large amplitude long-waves and high latitude blocking; (2) large-scale statistically significant annual average height change pattern; and (3) greater amplitude and variance of the Fourier-Bessel coefficients. Distinct seasonal differences in behavior of some of these change characteristics are noted. Average hemispheric height patterns for each season and subperiod are presented along with charts showing the height change patterns between the subperiods.
Dissert. Abstr.

N75-13423 Cornell Univ., Ithaca, N.Y.
HEAT REJECTION AND ROUGHNESS EFFECTS ON THE PLANETARY BOUNDARY LAYER ABOVE CITIES Ph.D. Thesis
David Paul Gutman 1974 238 p
Avail: Univ. Microfilms Order No. 74-24236

A study was undertaken to investigate the effects of and relationships among some of the causal factors which determine the thermal and flow structures of the winter nighttime urban heat island. The major factors of interest were artificial heat rejection rate and surface roughness parameter, while the factors studied in less detail were vertical heat source distribution, wind speed, atmospheric stratification, and land use pattern. The objectives were accomplished by developing a suitable set of differential equations following the laws of conservation of mass, momentum, energy, and water vapor and by developing a model for the coefficient of turbulent diffusion. These equations were discretized and solved numerically to obtain steady state fields of velocity, temperature, and moisture content over a two-dimensional region ninety kilometers in length and extending from one meter below the surface to a height of 1400 meters. The atmosphere was divided into a constant flux layer near the surface and a transition layer above.
Dissert. Abstr.

N75-13424 Michigan Univ., Ann Arbor.
NUMERICAL MODELS FOR PRECIPITATION SCAVENGING Ph.D. Thesis
Yean Lee 1974 96 p
Avail: Univ. Microfilms Order No. 74-25248

A model is designed for precipitation scavenging in stratiform clouds, which incorporates heuristic approximations of diffusive attachment, impact collection and accretion, and includes

consideration of particle and cloud droplet size spectra. Results indicate that: (1) no single rate constant can adequately express the removal by rain of airborne contaminant; (2) the contaminant concentration in the cloud air decreases exponentially with time when the processes of diffusive attachment and rainfall removal are considered; and (3) the fraction of the air concentration of contaminant is affected by processes of particle attachment and rainfall removal. A second model addresses the problem of air cleansing by a convective rain-generating system. Raindrop growth and motion in spatial contaminant concentration gradients are studied. It is shown that drops of different sizes can have the same concentration, and under the assumed conditions, a particular drop-size is identified with the minimum concentration. Dissert. Abstr.

N75-13425 California Univ., Riverside.
A MATHEMATICAL MODEL FOR DIAGNOSIS AND PREDICTION OF SURFACE WINDS IN MOUNTAINOUS TERRAIN Ph.D. Thesis
Bill Chatten Ryan 1974 147 p
Avail: Univ. Microfilms Order No. 74-25418

A model was developed on the premise that mountain winds are the result of vector addition of wind components generated and affected by various influences. The mathematical functions and techniques were formulated to define and integrate such components of the resultant wind in mountainous areas as valley-mountain wind, slope wind, sea breeze and land breeze, larger scale wind systems, and sheltering and diverting effect of topography. Model winds were computed and compared with available observed winds. Dissert. Abstr.

N75-13426 Michigan Univ., Ann Arbor.
POST-SUNSET BEHAVIOR OF THE 6300A ATOMIC OXYGEN AIRGLOW EMISSION Ph.D. Thesis
Robert Earl Smith 1974 197 p
Avail: Univ. Microfilms Order No. 74-25330

A theoretical model of the 6300A OI airglow emission was developed based on the assumptions that both the charged and neutral portions of the earth's upper atmosphere are in steady state conditions of diffusive equilibrium. Intensities of the 6300A OI emission line were calculated using electron density-true height profiles and exospheric temperatures as inputs to the model. Emission intensities resulting from the dissociative recombination of molecular oxygen ions were observed. They were used with limiting values of the quenching coefficients and the production mechanism efficiencies to establish a representative model of the atmosphere. Results show that the Jacchia model of the upper atmosphere combined with the Ackerman recommended solar radiation fluxes and associated absorption cross sections are closely in agreement with the observed intensities. Dissert. Abstr.

N75-13427*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EFFECT OF LIMB DARKENING ON EARTH RADIATION INCIDENT ON A SPHERICAL SATELLITE
S. Katzoff and G. Louis Smith Washington Dec. 1974 25 p refs
(NASA-TN-D-7807; L-9698) Avail: NTIS HC $3.25

The thermal radiation from the earth incident on a spherical satellite depends on the angular distribution of earth-emitted radiation. An analysis is presented of this dependency, and calculated results are given, based on a published limb-darkening curve for the earth. The curve was determined from Tiros data, and is a statistical average over the entire globe between 75 deg latitude. The computed effect of limb darkening was 1.8 percent at 900 km altitude, 2.5 percent at 500 km altitude, and 3.0 percent at 300 km altitude. Below 300 km, it increased rapidly with decreasing altitude. Discussion is included of various other problems inherent in the use of orbiting spheres and stabilized flat plates to measure the heat radiated from the earth. Author

N75-13428# Lockheed Missiles and Space Co., Palo Alto, Calif.
WORLD MAGNETIC MAPS OF THE 1970 EPOCH
V. I. Kolesova, E. P. Kropachev, L. S. Lysenko, L. A. Privalova, and T. N. Anshukova 11 Dec. 1972 9 p refs Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow), v. 14, no. 4, 1974 p 702-708
Avail: NTIS HC $3.25; National Translation Center, John Crerar Library, Chicago Ill. 60616

The world magnetic maps of the 1970 epoch and the method of their compilation by digital computer are described. Author

N75-13429# National Environmental Satellite Service, Washington, D.C. Office of Systems Integration.
THE OPERATION OF THE NOAA POLAR SATELLITE SYSTEM
Joseph J. Fortuna and Larry N. Hambrick Nov. 1974 137 p refs
(NOAA-TM-NESS-60) Avail: NTIS HC $5.75

The NOAA satellite, its launch configuration, its orbit, and its major subsystems are described. The operational system is discussed, including: Satellite Operations Control Center, two Command and Data Acquisition stations, a communications network, and a central processing facility. A direct broadcast service that transmits raw environmental data to local users within radio range is described along with a central service to transmit to the users products derived from satellite data. J.M.S.

N75-13430# Bergen Univ. (Norway). Dept. of Physics.
CLEFT SIGNATURE IN PROTON FLUXES ABOVE 100 keV
R. Amundsen, F. Soraas, and K. Aarsnes Apr. 1974 20 p refs
(TR-62) Avail: NTIS HC $3.25

Experimental evidence is presented that above 100 keV proton fluxes precipitating at high latitudes on the dayside constitute the high energy tail of the low energy proton population signaturing the polar cleft region. The precipitation zone of these higher energy protons covers the same latitude band as the low energy particles, and also experiences the same latitudinal displacements during changes in the geomagnetic conditions. The precipitation has an isotropic pitch angle distribution and the measured higher energy intensities compare favorably with values extrapolated from the spectrum at lower energies. The statistical invariant latitude pattern described by these above 100 keV precipitating protons in the magnetic local time span 06-18 hours is presented. Author

N75-13431# Geophysical Observatory, Sodankyla (Finland).
MEASURING THE ECHO AMPLITUDES OF SPORADIC E LAYER IN SWEPT FREQUENCY IONOSPHERIC SOUNDING
Tauro Turunen Apr. 1974 12 p refs
(Rept-6) Avail: NTIS HC $3.25

A simple and accurate system of amplitude measurements in ionospheric sounding is described. The system is first linearized by controlling the gain of the ionosonde in such a way that all signals in the receiving system are in the linear range of the receiver. This can be done by using echo-controlled automatic gain control (AGC). The output is then integrated to smooth out the fading components in the signal amplitudes, and finally another AGC is used on the averaged signal to produce an output at the desired level. The signal is used to make an ionogram. The vertical o-component of the thick layers forms the reference echo against which all other amplitudes are measured. It is thus possible to measure the reflection coefficient of a sporadic E layer at any frequency and to obtain the frequency dependence of the reflection coefficient of the sporadic E layer. Some examples are given. Author

N75-13432# Geophysical Observatory, Sodankyla (Finland).
GEOPHYSICAL VARIATIONS AT SODANKYLA DURING A GEOMAGNETIC STORM, 17-18 DECEMBER 1971
Tauno Turunen and M. Mukunda Rao May 1974 21 p refs
(Rept-9) Avail: NTIS HC $3.25

Extremely bright auroras could be seen at Sodankyla and throughout Scandinavia on the night of 17 - 18 December 1971. A detailed study was undertaken of the geophysical phenomena observed at Sodankyla during this storm. The all-sky camera records, magnetograms, riometer records, and ionograms obtained at Sodankyla were analyzed in detail and published data from neighboring stations were examined to elucidate the extent of the geomagnetic storm and its effects on the upper atmosphere. It was noted that the occurrence of active auroral forms overhead

was invariably followed by an increase of riometer absorption, and by changes in sporadic E. The analysis of this storm indicates that at least three substorms occurred during the main phase of the storm. Author

N75-13433# Geophysical Observatory, Sodankyla (Finland).
STATISTICAL BEHAVIOUR OF SPORADIC E AT SODANKYLA, 1958 - 1971
Tauro Turunen and M. Mukunda Rao Finnish Acad. of Sci. and Letters Oct. 1974 34 p refs
(Rept-11) Avail: NTIS HC $3.75

Data on sporadic E obtained at Sodankyla, Finland from an ionosonde between 1958 and 1971 were analyzed, and maps were compiled which depict the diurnal and seasonal variations during the period of the study. Both auroral and middle-latitude types of sporadic E behavior can be seen at Sodankyla. Few of the sporadic E parameters studied show any definite correlation with sunspot activity, in fact, most of them display powerful long-term variations quite unconnected with sunspot cycle. Author

N75-13434# Geophysical Observatory, Sodankyla (Finland).
BEHAVIOUR OF SPORADIC E IN THE BOUNDARY REGION OF AURORAL AND MIDDLE LATITUDE ZONES
Tauno Turunen and M. Mukunda Rao Finnish Acad. of Sci. and Letters May 1974 14 p refs
(Rept-10) Avail: NTIS HC $3.25

The behavior of the sporadic E phenomenon in the boundary region of the auroral and middle latitude zones was investigated for sunspot minimum and maximum periods making use of the data from some of the north European stations. It is evident that Sodankyla, Finland (Georgr. lat. 67.4 deg N; long. 26.7 deg E) lies very close to the boundary where the characteristics of both the zones could be observed. A detailed study of the various types of sporadic E observed at Sodankyla reveals a strong negative correlation between the occurrence of the middle latitude types and the auroral types of Es thus indicating a shift in the boundary with sunspot activity. Author

N75-13435# Suomalainen Tiedeakatemia, Sodankylae (Finland).
EXAMPLES OF IONOGRAM SEQUENCES FROM SODANKYLA
Tauno Turunen Jan. 1974 35 p
(Rept-5) Avail: NTIS HC $3.75

Examples of ionogram sequences are given which represent complicated ionospheric behavior at E-layer heights. The readings taken during a magnetic storm show rapid changes in the ionosphere by scattered and oblique echoes in the ionogram. A strong echo is indicated in an ionogram with the virtual height of the echo decreasing with increasing frequency. Such an occurence is probably caused by direct reflection from a moving auroral arc. Ionogram sequences are related to absorption occuring during auroral display. Author

N75-13436# Geophysical Observatory, Sodankyla (Finland).
SEQUENTIAL Es AT SODANKYLA
Tauno Turunen and M. Mukunda Rao Apr. 1974 14 p refs
(Rept-8) Avail: NTIS HC $3.25

Nine sequential Es events which occurred in the months of May, June and July, 1973, at Sodankyla, Finland were analyzed in detail. All the events occurred during the afternoon hours and they generally lasted 4 to 7 hours. It was found that the disturbance starts in the upper E region and lower F1 region and gradually descends to low E region altitudes. The time during which the blanketing frequency and top frequency of the disturbance were maximum corresponds with the time at which the disturbance reached the lowest altitude during the sequence. It is suggested that sequential Es is caused by the downward movement of ionized layers, which is due to a 'corkscrew' mechanism. The persistence of these layers at low altitudes is attributed to the abundance of metallic ions at these latitudes. Author

N75-13437# Suomalainen Tiedeakatemia, Helsinki (Finland).
IONOSPHERIC MEETING
Oct. 1973 12 p Meeting held at Sodankyla, 14-16 May 1973
(Rept-3) Avail: NTIS HC $3.25 CSCL 03B

Techniques in ionogram scaling are reviewed, along with parameters and difficulties in latitude ionospheric sounding. Blank and fixed gain ionograms are proposed for publication. Experiments on ionogram sequencing, fixed frequency recordings, interferometers, and polarimeters are presented. J.A.M.

N75-13438*# Linguistic Systems, Inc., Cambridge, Mass.
AUTOMATION OF THE COLLECTION AND ANALYSIS OF SCIENTIFIC INFORMATION IN THE PROBLEM OF THE INTERACTION OF THE ATMOSPHERE AND OCEAN
Ye. P. Borisenkov, ed. and I. A. Dyubkin, ed. Washington NASA Nov. 1974 192 p refs Transl. into ENGLISH of the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 140 p Publ. of the Order of Lenin Arctic and Antarctic Sci. Res. Inst., vol. 301
(Contract NASw-2482)
(NASA-TT-F-801) Avail: NTIS HC $7.00 CSCL 04A

Material from research into the interaction of the atmosphere and the ocean, including both experimental research conducted aboard scientific research vessels, and work of a theoretical nature is presented. A number of articles are devoted to the principles basic for a ship automated system that collects and analyzes oceanological data. The theoretical articles deal with the basic concepts of hydrodynamic models of atmospheric and oceanic circulation. For individual titles, see N75-13439 through N75-13450.

N75-13439* Linguistic Systems, Inc., Cambridge, Mass.
AUTOMATED SYSTEM FOR MEASUREMENT, COLLECTION AND PROCESSING OF HYDROMETEOROLOGICAL DATA ABOARD SCIENTIFIC RESEARCH VESSELS OF THE GUGMS (SIGMA-s) c60
Ye. P. Borisenkov and O. M. Fedorov *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 1-18 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 5-18 (For availability see N75-13438 04-46)
CSCL 05B

A report is made on the automated system known as SIGMA-s for the measurement, collection, and processing of hydrometeorological data aboard scientific research vessels of the Hydrometeorological Service. The various components of the system and the interfacing between them are described, as well as the projects that the system is equipped to handle. Author

N75-13440* Linguistic Systems, Inc., Cambridge, Mass.
SOFTWARE FOR THE SIGMA-s c61
I. A. Dyubkin *In its* Automation of the collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 19-33 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 19-30 (For availability see N75-13438 04-46)
CSCL 09B

The software needed for the SIGMA-s is described. Various mathematical procedures, such as introducing corrections and parameters, interpolating for depth and altitude, isolating special points and layers in the distribution of hydrometeorological elements, smoothing of signals from sensors, critical analysis of and setting up the results in graphs and tables, coding of the data into information carriers, and recording of the data, are presented. Author

N75-13441* Linguistic Systems, Inc., Cambridge, Mass.
THE PROBLEM OF ORGANIZATION OF A COASTAL COORDINATING COMPUTER CENTER c62
I. A. Dyubkin and I. I. Lodkin *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 34-48 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 32-42 (For availability see N75-13438 04-46)
CSCL 09B

The fundamental principles of the operation of a coastal coordinating and computing center under conditions of automation are presented. Special attention is devoted to the work of Coastal Computer Center of the Arctic and Antarctic Scientific Research Institute. This center generalizes from data collected in expeditions and also from observations made at polar stations. Author

N75-13442* Linguistic Systems, Inc., Cambridge, Mass.
A SYSTEM OF AUTOMATED PROCESSING OF DEEP WATER HYDROLOGICAL INFORMATION c60
V. A. Romantsov, I. A. Dyubkin, and L. N. Klyukbin *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 49-70 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 43-58 (For availability see N75-13438 04-46)
CSCL 05B

An automated system for primary and scientific analysis of deep water hydrological information is presented. Primary processing of the data in this system is carried out on a drifting station, which also calculates the parameters of vertical stability of the sea layers, as well as their depths and altitudes. Methods of processing the raw data are described. Author

N75-13443* Linguistic Systems, Inc., Cambridge, Mass.
ERROR IN INTERPOLATION AND CHOICE OF THE RANGE OF DISCRETENESS IN MEASUREMENTS IN A HYDROPHYSICAL FIELD c82
O. F. Zudin and B. A. Nelepo *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 71-79 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 59-64 (For availability see N75-13438 04-46)
CSCL 05B

Errors in interpolation and the choosing of the range of discreteness when making measurements in a hydrophysical field are discussed. Equations for optimum interpolating based on the theory of linear interpolation of stationary random sequences are presented; analogous equations are derived for the case of data collected at stations located at the apices of a right triangle. Author

N75-13444* Linguistic Systems, Inc., Cambridge, Mass.
THE PROBLEM OF SELECTING AN OPTIMUM FREQUENCY FOR A MEASURING GENERATOR IN DETERMINING THE VALUE OF THE HYDROPHYSICAL PARAMETER WITH A GIVEN ACCURACY c35
V. A. Stepanyuk *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 80-84 ref Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 65-67 (For availability see N75-13438 04-46)
CSCL 14B

The selection of the optimum frequency for a measuring generator for determining the value of the hydrophysical parameter with a given degree of accuracy is discussed. Methods from information theory for measuring generators are described. Conversion of the frequency of generators into digital form by means of statistical averaging is also described. Author

N75-13445* Linguistic Systems, Inc., Cambridge, Mass.
SMALL PARAMETRIC MODEL OF THE PRECOMPUTATION OF METEOROLOGICAL FIELDS ON THE BASIS OF COMPLETE EQUATIONS AND ITS ENERGETIC ANALOGS c60
Ye. P. Borisenkov *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 85-111 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 68-88 (For availability see N75-13438 04-46)
CSCL 09B

A small parametric, nonadiabatic model for precomputation of meteorological fields on the basis of complete equations, along with its energetic analogs is described. The model incorporates integral characteristics of the components of the wind speed and the analogous functions of the total fluxes of the ocean, and uses a Cartesian isobaric system of coordinates. Author

N75-13446* Linguistic Systems, Inc., Cambridge, Mass.
ESTIMATE OF HEAT FLUXES ON THE SUBJACENT SURFACE (ACCORDING TO DATA FROM SYNOPTIC ANALYSIS) c47
A. P. Nagurnyy *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 112-120 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 89-95 (For availability see N75-13438 04-46)
CSCL 04B

Several methods of estimating heat fluxes from nonadiabatic sources distributed over a subjacent surface were discussed. Data calculated by synoptic analysis for the entire Northern Hemisphere from aerological soundings at the AT500 and AT400 level, along with the temperature of the subjacent surfaces, were used. A polytropic model of the atmosphere is used in order to avoid the problems posed by the lack of any complete theory of heat transfer in the lower atmosphere. Author

N75-13447* Linguistic Systems, Inc., Cambridge, Mass.
A SMALL PARAMETER MODEL OF CIRCULATION IN A HOMOGENEOUS BAROCLINIC OCEAN c48
Ye. P. Borisenkov *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of The Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 121-144 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 96-113 (For availability see N75-13438 04-46)
CSCL 08C

A small parameter model of circulation in a homogeneous baroclinic ocean is presented. The principles common to the construction of small parameter models and certain energetic principles developed in connection with atmospheric processes are made use of. These principles were applied in the study of processes in a baroclinic ocean. Author

N75-13448* Linguistic Systems, Inc., Cambridge, Mass.
THE PROBLEM OF THE INFLUENCE OF OCEAN CURRENTS ON FREE INTERNAL GRAVITY WAVES c48
V. G. Savchenko and Z. R. Fuks *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 145-158 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 114-123 (For availability see N75-13438 04-46)
CSCL 08C

The influence of ocean currents on free internal gravity waves is discussed. The dependence of the parameters of gravity waves on the characteristics of stationary marine currents is described. Necessary conditions for existence of these waves are obtained, and the phenomenon of abrubt changes in phase of the internal oscillation with depth is explained. Author

N75-13449* Linguistic Systems, Inc., Cambridge, Mass.
THE PROBLEM OF CALCULATING CLOUD COVER IN CALCULATIONS OF LONG WAVE RADIATIONAL CHARACTERISTICS OF THE ATMOSPHERE c47
Z. P. Galakhov *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 159-168 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 124-130 (For availability see N75-13438 04-46)
CSCL 04A

The results of calculating the fluxes of outgoing long wave radiation, taking cloud cover into account, on the basis of mean monthly data are described. A three-level and a nine-level model of the atmosphere is used, the latter with a one-hundred millibar level as upper limit. Data used in the calculations was collected over many years. Author

N75-13450* Linguistic Systems, Inc., Cambridge, Mass.
RECONSTRUCTING THE VERTICAL PROFILE OF HUMIDITY ON THE BASIS OF THE VERTICAL PROFILE OF TEMPERATURE
T. I. Bazlova *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 169-185 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 131-139 (For availability see N75-13438 04-46)
CSCL 04A

The vertical profile of humidity in the atmosphere is developed on the basis of the vertical profile of temperature using an empirical formula linking changes in humidity with changes in temperature and altitude. The atmosphere is divided into three layers by altitude, since the condition for the formation of humidity varies with altitude. Author

N75-13451*# Alaska Univ., Fairbanks. Geophysical Inst.
TELEVISION OBSERVATIONS OF ARTIFICIAL AURORA AND ANALYSES OF FLIGHT DATA FROM NASA PAYLOAD 12.18 NE Final Report
T. N. Davis Oct. 1974 37 p refs
(Contract NAS9-11815)
(NASA-CR-140379) Avail: NTIS HC $3.75 CSCL 04A

An accelerator nominally capable of ejecting pulses of electrons up to 6 sec in length, current to 500 ma and energy to 20 keV was flown on a rocket at 1500 October 15, 1972. The Strypi rocket was launched from the Pacific Missile Range Facility at Kauai, Hawaii. The intent was to eject electron pulses of various characteristics upwards along the magnetic field so as to produce artificial auroras in the conjugate (Southern Hemisphere) atmosphere and possibly to produce weaker auroras in the nearby atmosphere as a consequence of backscattered electrons. The accelerator package included a gas jet actuated attitude control system controlled by gyros. Attitude sensing also was accomplished by a two-axis fluxgate magnetometer, and a large foil was deployed to collect ambient electrons to neutralize the accelerator when it ejected high-energy electrons. Scientific instrumentation contained on the flight package included retarding potential analyzers, energetic electron detectors, and detectors to sense very low frequency radio noise. Image orthicon television systems and other optical sensors were operated in the conjugate region aboard two NC-135 jet aircrafts based in Samoa. Similar devices were operated at Haleakela, Hawaii, to attempt detection of auroras caused by backscattered electrons. Author

N75-13452*# Chicago Univ., Ill. Dept. of the Geophysical Sciences.
REMOTE SOUNDING OF STRATOSPHERIC TEMPERATURES USING HIGH RESOLUTION RADIANCE MEASUREMENTS FROM THE IRIS-D M.S. Thesis
William O. Gallery Dec. 1974 119 p refs
(Grant NGR-14-001-194)
(NASA-CR-141130) Avail: NTIS HC $5.25 CSCL 04A

Remote sounding of stratospheric temperatures up to 3.2 millibars is attempted using high resolution (unapodized) radiance measurements in the 15 micron CO2 band from the infrared Interferometer Spectrometer on Nimbus 4. Inversions are performed using the Chahine relaxation technique. Radiance data and simultaneous in situ temperature profiles are obtained from the Rocket/Nimbus Sounder Comparison. Numerical tests with synthetic radiance data show that the uncertainty in the retrieved temperatures due to random instrument noise is about 1.1 K when averaged over layers about 10 km thick. However, comparison of the measured radiances with the radiances calculated from the in situ profiles show the calculated radiances to be systematically higher than the measured radiances. The evidence indicates that systematic errors exist in both the radiance and the in situ measurements. Author

N75-13453# Lockheed Missiles and Space Co., Palo Alto, Calif.
DUMPING OF CHARGED PARTICLES FROM THE RADIATION BELTS AND VARIATION IN THE KNCh RADIATION INTENSITY IN THE RESTORATION PHASE OF THE 16-17 DECEMBER 1971 MAGNETIC STORM
N. V. Vakulov, Iu. Dubinski, A. V. Zakharov, K. Kudela, S. K. Kuznetsov, V. A. Kuznetsova, V. I. Larkina, Ia. I. Likhter, S. Fischer, and I. A. Iuzefovich [1974] 10 p refs Transl. into ENGLISH from Kosmich. Issled., v. 12, no. 5, 1974 p 707-715
Avail: NTIS HC $3.25; National Translations Center, John Crerar Library, Chicago, Ill. 60616

Data on flux measurements of protons and electrons being dumped and on the KNCh and ONCh radiation intensities obtained by using the Interkosmos-5 are analyzed. The fluxes of the quasi-trapped and dumped protons were recorded at L approximately greater than 38, where the protons being dumped were observed outside the plasmosphere. Electron dumping was observed in the early evening hours within the plasmosphere and ceased at the boundary of the plasmosphere. Electron dumping was pulsating in nature and accompanied by intense pulsating ONCh radiation. Author

N75-13454# Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
AUSTRALIAN AND SOVIET GRAVITY SURVEYS ALONG THE AUSTRALIAN CALIBRATION LINE
P. Wellman, Yu. O. Boulanger, B. C. Barlow, S. N. Scheglov, and D. A. Coutts 1974 177 p refs
(Bull-161; ISBN-0-642-00853-1) Avail: NTIS HC $7.00

The Australian calibration line (ACL), with a total gravity interval of 3 Gal, was established in 1970 between Laiagam in Papua New Guinea and Hobart in Tasmania, and during 1973 the Australian Bureau of Mineral Resources and the U.S.S.R. Geodesy and Cartography Survey made joint observations along the full length of the ACL. Measurements made with eight Soviet GAG-2 gravity meters established a gravity scale for Australia to an accuracy of 2.5 parts in 10 to the 5th power. This scale and a datum of 979671.86 mGal for Sydney A were adopted for Australia in 1973. The complete data are shown in tabular form. Author

N75-13455# Environmental Data Service, Washington, D.C.
CATALOG OF EARTHQUAKE PHOTOGRAPHS Key to Geophysical Records, Documentation No. 3
Jerry L. Coffman, comp. Nov. 1974 46 p
Avail: NTIS HC $3.75

This catalog represents a beginning effort to systematically collect photographs and maps from many sources and to make them generally available. This publication lists approximately 300 photographs and 200 maps on the subject of earthquakes and contains descriptions and examples of the collection. Many of the photographs show views of earthquake-damaged buildings, bridges, dams, and other man-made structures; several show spectacular landslides, rifts, and ground cracks resulting from destructive shocks. The maps depict intensity distribution of important earthquakes and the seismicity of areas throughout the world. Author

N75-13456# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics
METHOD OF ATTENUATION OF THE GEOMAGNETIC FIELD
Yu V. Taran 1974 14 p ref In RUSSIAN
(JINR-P3-7785) Avail: AEC Depository Libraries HC $4.00

The description is given of the method to attenuate the geomagnetic field (GMF) using a single-layer cylindrical screen of softmagnetic material magnetized in such a way that the scattered magnetic field compensates, inside the screen, the penetrated and diminished GMF. The screening efficiency is increased experimentally, as compared with that of nonmagnetized screen, by 30 to 150 times depending on the method of magnetization. Two ways are described-current and thermal ones-for obtaining the desired screen magnetization.
Author (NSA)

N75-13457# California Univ., Livermore. Lawrence Livermore Lab.
DIURNAL KINETIC MODELING
R. J. Gelinas Jan. 1974 43 p Presented at the 1st Special Assembly of the Intern. Assoc. of Meteorology and Atmospheric Phys., Melbourne, 14 Jan. 1974 Sponsored by AEC
(UCRL-75373; Conf-740106-5) Avail: NTIS HC $3.75

The simple localizing approach is taken to diurnal problems and the implications to the physical interpretability of such models are emphasized. Reaction sets of increasing complexity are mechanistically considered for 20 km and various time spans. LLL versions of the Gear method are used to integrate the reaction sets. The numerical difficulties encountered by high-accuracy ordinary differential equation solvers in connection with time-varying reaction coefficients are described and strategies to delay integration abortions are indicated. The reliability of these strategies is also considered. Solutions for various reaction sets and selected conditions are presented and analyzed in the context of conventional (non-localized) models that employ constant photodissociation rates. Sensitivities to uncertainties in microscopic absorption and quantum yield data and to solar flux uncertainties are indicated. Author (NSA)

N75-13458# California Univ., Livermore. Lawrence Livermore Lab.
ENVIRONMENTAL DEFINITION PROGRAM Final Report, period ending 30 Jun. 1974
J. B. Knox and J. E. Lovill 25 Jul. 1974 12 p Sponsored in part by DNA
(Contract W-7405-eng-48)
(UCID-16565) Avail: NTIS HC $3.25

Satellite monitoring of the stratosphere and troposphere is conducted to provide thousands of vertical profiles each day of temperature, water vapor, ozone, ice and liquid cloud contents, and various discrete radiational emission spectra. The data acquired and computer codes being developed to analyze the data are discussed. NSA

N75-13459# Sandia Labs., Albuquerque, N.Mex.
DYNAMIC RESPONSE OF GEOLOGICAL MATERIALS TO PULSED ELECTRON BEAM DEPOSITION
G. A. Carlson and T. M. Kerley Jul. 1974 25 p refs
(Contract AT(29-1)-789)
(SLA-74-0248) Avail: NTIS HC $3.25

A technique is demonstrated for determining the Gruneisen parameter, stress wave attenuation, and dynamic tensile strength of geological materials. The technique is applied to two novaculites and one granite. Gruneisen parameter and attenuation data are explained by the degree of porosity and homogeneity of the materials involved. Dynamic tensile strengths (1-4 kbar) are higher than previously observed, probably due to the very short time under tension. This work is in support of studies on the use of pulsed electron beams for fracturing rocks in drilling, tunnelling, excavation, and mining operations. NSA

N75-13460# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
REPRESENTATION OF CERTAIN TIME HARMONICS OF GEOPOTENTIAL AND VELOCITY BY MEANS OF ELLIPTICAL WEIRSTRASS FUNCTIONS IN THE MODEL OF AN EQUIVALENT-BAROTROPIC LEVEL OF THE ATMOSPHERE
V. A. Snegerev 10 Sep. 1974 17 p refs Transl. into ENGLISH from Tr. Gidrometeorol. Nauch.-Issled. Tsentr. SSSR (USSR), no. 104, 1972 p 32-41
(AD-786109; FTD-HC-23-2096-74) Avail: NTIS CSCL 04/2

The comparative simplicity of the spectral form of equations of dynamics, based on the generalized spherical functions, makes it possible to obtain analytical solutions for the simplest physical models of the atmosphere, at least for systems of a low order. For the model of the middle level and an equivalent barotropic level of the atmosphere, the solutions found have a characteristic feature: the time harmonics of the geopotential and the velocity are a superposition of the exponential functions. Author

N75-13461# Stanford Research Inst., Menlo Park, Calif.
ANALYSIS TECHNIQUES FOR INCOHERENT-SCATTER DATA INTERPRETATION IN THE 100-300 km REGION
Vincent B. Wickwar Jan. 1974 74 p refs
(Contract DNA001-72-C-0076; DNA Proj. NWET-L25-AAXH)
(AD-785825; DNA-3335T) Avail: NTIS CSCL 04/1

This report examines the factors involved in the derivation of temperature information from Chatanika radar data by means of a least-squares fitting of theoretical autocorrelation functions (ACF) to the measured ACFs. The combined influence of these factors and the range of possible interpretations is shown for models of the auroral and daytime ionospheres. Finally, an indication is given of what remains to be examined and done to fully implement the least-squares fitting procedure. (Modified author abstract) GRA

N75-13462# Israel Program for Scientific Translations, Ltd., Jerusalem.
PROBLEMS OF THE ARCTIC AND ANTARCTIC, NO. 40
A. F. Treshnikov, ed. 1973 139 p refs Transl. into ENGLISH of the book "Problemy Arktiki i Antarktiki" Leningrad, Gidrometeorizdat, Issue 40, 1972 Sponsored by NSF
(TT-72-50089) Avail: NTIS HC $5.75

Russian papers on research in the arctic are presented. Studies on ocean currents, ice movements, and meteorology are included. GRA

N75-13463# Israel Program for Scientific Translations, Ltd., Jerusalem.
THE PHYSICS OF MESOSPHERIC (NOCTILUCENT) CLOUDS
J. Ikaunieks, ed. 1973 165 p refs Transl. into ENGLISH of the book "Fizika Mezosfernykh (Serebristykh) Oblakov" Riga, Izdatelstvo Zinatne, 1970 Proc. of the Conf. on Mesospheric Clouds, Riga, 20-23 Nov. 1968 Sponsored by NOAA and NSF
(TT-73-50018) Avail: NTIS HC $6.25 CSCL 04A

Noctilucent (mesospheric) clouds are associated with features of the thermal conditions of the mesopause. Investigations have established that the atmospheric layer near the mesopause is under the direct influence of cosmic factors, especially solar activity. Investigations of noctilucent clouds were previously conducted only by terrestrial observations, but in recent years the upper atmosphere, where noctilucent clouds occur, has been studied with the aid of rocket-borne instruments. Space observations of noctilucent clouds are very promising. The collection, compiled from papers read at the conference on mesospheric (noctilucent) clouds deals with these and other problems connected with the study of noctilucent clouds. GRA

N75-13464# Israel Program for Scientific Translations, Ltd., Jerusalem.
CLOUD PHYSICS AND WEATHER MODIFICATION
Yu. S. Sedunov, ed. 1974 112 p refs Transl. into ENGLISH of the book "Problemy Fiziki Oblakov i Aktivnykh Vozdeistvii" Moscow, Moskovskoe Otdelenie Gidrometeoizdata, no. 19, 1970 Sponsored by NOAA and NSF
(TT-73-50031) Avail: NTIS HC $5.25 CSCL 04B

Various trends in cloud physics and cloud modification are presented. The organization of relevant research in the United States of America is examined and the cloud resources of U.S.S.R. are discussed with a view toward utilization in cloud modification. Methods were surveyed, for measuring cloud condensation nuclei. Applications of the latest theoretical and experimental work in aerosol hydrodynamics to a number of aspects of cloud physics are included. Author

N75-13465# Montana State Univ., Bozeman. Dept. of Earth Sciences.
ATMOSPHERIC WATER RESOURCES MANAGEMENT PROGRAM. BRIDGER RANGE CLOUD SEEDING EXPERIMENT Final Report
A. B. Super, J. A. Heimbach, J. T. McPartland, and V. L. Mitchell 15 Apr. 1974 416 p refs
(Contract DI-14-06-D-6798)
(PB-234012/3) Avail: NTIS HC $10.50 CSCL 04B

Winter cloud seeding experiments conducted in the Bridger Range of southwestern Montana, and the analysis of a three winter randomized seeding experiment are discussed. Also considered is airborne plume tracing of silver iodide over and downwind of the Bridger Range, confirming earlier work indicating that targeting was usually successful with westerly flow. Several

studies discussed support the statistical analysis of the randomized cloud seeding experiment. These include a stepwise multiple regression analysis relating nonseeded precipitation to upper air parameters. Cloud thickness was most closely related to snowfall of the parameters considered in this analysis. GRA

N75-13466# Drexel Univ., Philadelphia, Pa. Dept. of Physics and Atmospheric Sciences.
MEASUREMENT OF ATMOSPHERIC TEMPERATURE PROFILES Final Report
John A. Cooney Aug. 1974 32 p refs
(Grants DA-ARO(D)-31-124-73-G166; DAHC04-74-G-0157) (AD-785741; AROD-11171-1-EN; FR-1) Avail: NTIS CSCL 04/2

The equilibrium distribution of atmospheric N2 and O2 among their possible molecular rotational states is a very precise measure of the gas temperature. Hence the rotational spectrum can provide a faithful measure of temperature. By monitoring separate portions of the Raman rotational state, a pair of signals generated simultaneously can be differenced (or their logarithms can be differenced) and the difference signal is a measure of the temperature. Raman lidar was used in this fashion to generate such signals in a prototype experiment. While time and funds were insufficient to develop the electronic processing to the required sensitivity, measurements of such temperature profiles have been made and compared to temperature profiles as measured by radiosonde. Tight space and moderate time correlation were maintained for the comparison of the two types of temperature profiles. Author (GRA)

N75-13467# Army Cold Regions Research and Engineering Lab., Hanover, N.H.
A SEA ICE TERRAIN AND MOBILITY MODEL
William D. Hibler, III 1974 16 p refs
(AD-785631) Avail: NTIS CSCL 08/12

With the advent of a new generation of air cushion vehicles, often called surface effects vehicles (SEV), the nature of the Arctic pack ice as a vehicle terrain has taken on military and commercial significance. Because of this significance, studies have recently been carried out at U.S.A. CRREL in order to effectively characterize sea ice terrain for purposes of SEV mobility, as well as for other types of vehicles. These studies have involved aerial stereo photography, airborne laser profilometry, and ground measurements performed on the pack ice surface. GRA

N75-13468# Tel-Aviv Univ. (Israel). Dept. of Environmental Sciences.
THE COALESCENCE OF WATER DROPS Annual Report, 1 Dec. 1972 - 1 Dec. 1973
Zev Levin Aug. 1974 45 p refs
(Contract DAJA37-73-C-1580; DA Proj. 2M0-61102-B-53B) (AD-784198) Avail: NTIS CSCL 04/2

The report presents the first year results of a theoretical study which attempts to explain the phenomena of coalescence of drops. Even though the model represents a gross simplification of the real situation, it shows remarkable agreement with some of the experimental results which were recently published. At this stage the model investigates the effects of the viscous force between the interacting drops, but future work will include both the effects of the electrical double layer and the oscillation of the surfaces of the drops. Author (GRA)

N75-13709* Scripta Publishing Corp., Washington, D.C.
HYDROMAGNETIC WAVES GUIDED BY THE GEOMAGNETIC FIELD
L. L. Vanyan, L. A. Abramov, M. B. Gokhberg, and V. L. Yudovich *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 34-44 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 26-32 (For availability see N75-13707 04-90)
CSCL 03B

N75-13712* Scripta Publishing Corp., Washington, D.C.
ANALYSIS OF METHODS OF MEASURING ELECTRIC-FIELD STRENGTH IN THE MAGNETOSPHERE
S. I. Klimov *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 68-82 refs Transl. into ENGLISH of the book "Mezphlanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 50-59 (For availability see N75-13707 04-90)
CSCL 03B

N75-13719* Scripta Publishing Corp., Washington, D.C.
CALCULATION OF THE SHAPE OF THE BOUNDARY OF THE MAGNETOSPHERE
S. A. Martyanov *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 224-246 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 164-178 (For availability see N75-13707 04-90)
CSCL 03B

N75-13720* Scripta Publishing Corp., Washington, D.C.
TRANSPORT OF CHARGED PARTICLES IN THE EARTH'S MAGNETOSPHERE
V. P. Shalimov *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 247-265 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 179-190 (For availability see N75-13707 04-90)
CSCL 03B

N75-13721* Scripta Publishing Corp., Washington, D.C.
VIBRATIONS OF THE EARTH'S MAGNETIC TAIL
A. I. Yershkovich and A. A. Nusinov *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 267-273 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 191-195 (For availability see N75-13707 04-90)
CSCL 03B

N75-13738* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IMPACT CRATERING MECHANICS AND STRUCTURES
Donald E. Gault, William L. Quaide, and Verne R. Oberbeck *In its* A Primer in Lunar Geology Jul. 1974 p 177-189 refs Repr. from Shock Metamorphism of Natural materials, 1968 p 87-89 (For availability see N75-13730 04-91)
CSCL 08E

N75-13764* Santa Clara Univ., Calif.
IMPACT CRATER EXPERIMENTS
Ronald Greeley *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 527-531 refs (For availability see N75-13730 04-91)
CSCL 08E

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N75-13469 Saint Louis Univ., Mo.
A NUMERICAL STUDY OF SOME EFFECTS OF THE LOW LEVEL MOISTURE DISTRIBUTION ON THE THERMAL STRUCTURE OF A SEVERE THUNDERSTORM Ph.D. Thesis
Heng-Jen Hwang 1973 74 p
Avail: Univ. Microfilms Order No. 74-24098

A four-layer, nonentraining, axial-symmetric, steady-state model of a severe thunderstorm with a rotating updraft is used to study some effects of the low-level moisutre fields on the thermal and dynamical structure of the storm. This model represents the third in a series of three models which have been produced at Saint Louis University. It differs from the other two, by the fact that moisture becomes a specified input parameter rather than a deduced one. The three models have been checked to assure their internal consistency so that any one of them can be used to generate a common field of gridded variables depending upon the nature of the observed evidence at hand. Dissert. Abstr.

N75-13470 Saint Louis Univ., Mo.
APPLICATION AND APPLICABILITY OF HYDRODYNAMIC INSTABILITY THEORIES TO THE FORMATION OF SEVERE THUNDERSTORMS Ph.D. Thesis
Roderick Arthur Scofield 1973 135 p
Avail: Univ. Microfilms Order No. 74-24142

The feasibility of applying various hydrodynamic instability theories, to the formative stage of a severe thunderstorm is considered. The term development stage refers to that time period in the early life history of a severe thunderstorm when the mean meso-depression predominates. The mean meso-depression is a balanced vortex characteristic of the subsynoptic scale environment. The method is to proceed as it pertains to a severe storm vortex toward solutions which incorporate the effects of friction and diabatic heating. The analytical solution for the homogeneous portion of the resultant equation represents the streamline flow of the free circulation. The growth rate of the system was then determined as an eigenvalue. This growth rate is found to be primarily a function of the stability of the atmosphere and horizontal and vertical wave numbers of the superimposed mesoscale perturbations. Dissert. Abstr.

N75-13471 Wisconsin Univ., Madison.
THE PRODUCTION OF AVAILABLE THUNDERSTORM ENERGY Ph.D. Thesis
David Arthur Barber 1974 74 p
Avail: Univ. Microfilms Order No. 74-19321

The processes leading to destabilization during the half day preceding tornado occurrence are studied through the concept of available thunderstorm energy. The available thunderstorm energy is defined as the net work done by the buoyancy force on all parcels in idealized up- and down-draft cores. This measure of stability is computed through application of parcel theory to a set of tornado proximity soundings each of which has been paired with the sounding taken at the same location 12 hours earlier. The results are compared with a set of thunderstorm proximity soundings and a random sample. It is found that low level warming and moistening dominate the production of available thunderstorm energy in tornado cases with little change in the upper level temperatures. Strong warm advection is largely offset by rising motion in layers above 850 mb. Dissert. Abstr.

N75-13472 Saint Louis Univ., Mo.
A POSSIBLE ROLE OF DISTINCT CIRRUS FORMATIONS AND THEIR SUBSEQUENT MOVEMENT IN TRIGGERING SEVERE LOCAL STORMS Ph.D. Thesis
William Eugene Williams 1974 80 p
Avail: Univ. Microfilms Order No. 74-24160

Cirrus formations and their movement are used to forecast severe local storms. Streamline, isotach, and isobaric charts for various atmospheric levels were analyzed to obtain the grid-point values of horizontal velocity components, temperature, and mixing ratio for the mean flow. Mean horizontal divergences, relative vorticities, and vertical velocities were computed. A horizontal mesh with grid spacing of 120 nautical miles toward the east and the north was employed. The sensible heat and moisture fluxes of the synoptic environment conductive to thunderstorms development were assessed. Convective transfer of heat energy was estimated from the thermodynamic energy equation and convective upward motion was inferred from the distribution of convective heat fluxes obtained. Strong evidence was provided that an upper-level 'sub-synoptic trough' was intimately associated with the cirrus. The cirrus was accompanied by a local maximum value of mean heat fluxes which produced an upward convective heat transfer. The convective motion appeared to combine with favorable divergence conditions just before the development of the squall line that produced the severe weather. Coupling the low level preexisting upward motion below an inversion with the upward convection motion accompany the cirrus released the conditional instability. Dissert. Abstr.

N75-13473 Wisconsin Univ., Madison.
THE THREE DIMENSIONAL NATURE OF AUSTRALIAN WINTER AIRMASSES Ph.D. Thesis
Neil Stuart McDonald 1974 207 p
Avail: Univ. Microfilms Order No. 74-19342

Airmasses present over Australia in July are studied. At 18 Australian radiosonde stations the standard upper air variables were converted to potential temperature, mixing ratio, and equivalent potential temperature for individual soundings. A principal component analysis reduced these variables into coefficients or weightings on the significant eigenvectors of the data set. A partial collective analysis assessed the degree to which the weightings group together. With support of the daily maximum temperatures at 120 stations, horizontal patterns were more fully defined. For each of the eight airmasses identified, the mean maximum temperature, the mean characteristic curve, the frequency of occurrence and the interplay between the airmass and weather types is given. A new classification scheme is proposed. Dissert. Abstr.

N75-13474 Freie Univ., Berlin (West Germany).
METEOROLOGICAL DATA. VOLUME 134, NO. 2: THE CIRCULATION AT THE 100 mb LEVEL FOR THE YEARS 1971 AND 1972 USING MONTHLY MEDIAN CHARTS [METEOROLOGISCHE ABHANDLUNGEN. BAND 134, HEFT: 2 DER ZIRKULATIONSVERLAUF IN DER 100-mb-FLAECHE IN DEN JAHREN 1971 UND 1972 AN HAND MONTALICHER MITTELKARTEN]
Ingrid Bushner and Arbeitsgruppe Stratosphaere 1974 134 p refs In GERMAN; ENGLISH summary
Avail: Issuing Activity

The circulation pattern at the 100-mb level during the years 1971 and 1972 over the Northern Hemisphere is described using monthly mean values. Relationships to the troposphere and the middle stratosphere are shown and comparisons are made with climatological series. The maps of the monthly mean values, their monthly changes, their deviations from the ten years mean 1951-60, and for the year 1972 also the latitude anomalies are included. Additionally the monthly mean values of heights and temperatures have been tabulated. Author

N75-13475 Freie Univ., Berlin (West Germany).
METEOROLOGICAL DATA. VOLUME 136, NO. 3: AEROLOGICAL DATA AT BERLIN TEMPELHOF, JULY - SEPTEMBER 1973 [METEOROLOGISCHE ABHANDLUNGEN. BAND 136, HEFT 3: AEROLOGISCHE DATEN BERLIN-TEMPELHOF, JULI - SEPTEMBER 1973]
1973 237 p In GERMAN; ENGLISH summary
Avail: Issuing Activity

The detailed results of the radiosonde ascents performed by the aerological station of the Institut fur Meteorologie der Freien Universitat Berlin are presented in tabular and graphical form. Extreme and mean values of the temperature, pressure, geopotential, wind data, refractivity, pseudopotential temperature and velocity of sound, were extracted for all standard pressure surfaces, several height levels, the tropopause and the freezing level. Author

N75-13476 Freie Univ., Berlin (West Germany).
METEOROLOGICAL DATA. VOLUME 141, NO. 5: RESULTS OF THE SYNOPTIC SERVICE DURING 1974. DAILY AND MONTHLY WEATHER MAPS (GROUND, 850 mb, 500 mb), TABLES AND BRIEF SCIENTIFIC ARTICLES, MAY [METEOROLOGISCHE ABHANDLUNGEN. BAND 141, HEFT 5: ERGEBNISSE DES SYNOPTISCHEN DIENSTES IM JAHRE 1974. TAEGLICHE UND MONATLICHE WETTERKARTEN (BODEN, 850mb, 500mb), TABELLEN UND KLEINERE WISSENSCHAFTLICHE AUFSAETZE, MAI]
1974 177 p In GERMAN
Avail: Issuing Activity

Daily and monthly Northern Hemisphere ground level 850 mb, and 500 mb height and temperature analyses of constant pressure levels for May 1974 are presented. Included scientific studies cover aspects of synoptic climatology over the Berlin sector, data on atmospheric radioactivity and dust content, and weather predictions for Central Europe. Transl. by G.G.

N75-13477 Freie Univ., Berlin (West Germany).
METEOROLOGICAL DATA. VOLUME 141, NO. 6: RESULTS OF THE SYNOPTIC SERVICE DURING 1974. DAILY AND MONTHLY WEATHER MAPS (GROUND, 850 mb, 500 mb), TABLES AND BRIEF SCIENTIFIC ARTICLES, JUNE [METEOROLOGISCHE ABHANDLUNGEN. BAND 141, HEFT 6: ERGEBNISSE DES SYNOPTISCHEN DIENSTES IM JAHRE 1974. TAEGLICHE UND MONATLICHE WET-

TERKARTEN (BODEN, 850mb, 500mb), TABELLEN UND KLEINERE WISSENSCHAFTLICHE AUFSAETZE, JUNI]
1974 159 p In GERMAN
Avail: Issuing Activity

Daily and monthly Northern Hemisphere ground level, 850 mb, and 500 mb height and temperature analyses of constant pressure levels for June 1974 are presented. Included scientific studies cover aspects of synoptic climatology over the Berlin sector, data on atmospheric radioactivity and dust content, lunar eclipse observations, and snowfall measurements.
Transl. by G.G.

N75-13478 Freie Univ., Berlin (West Germany). Inst. Fuer Meteorologie.
METEOROLOGICAL DATA. VOLUME 141 NO. 4: RESULTS OF THE SYNOPTIC SERVICE DURING 1974. DAILY AND MONTHLY WEATHER MAPS (GROUND, 850 mb, 500 mb, TABLES AND BRIEF SCIENTIFIC ARTICLES, APRIL [METEOROLOGISCHE ABHANDLUNGEN. BAND 141, HEFT 4: ERGEBNISSE DES SYNOPTISCHEN DIENSTES IM JAHRE 1974. TAEGLICHE UND MONATLICHE WETTERKARTEN (BODEN, 850 MB, 500 MB), TABELLEN UND KLEINERE WISSENSCHAFTLICHE AUFSAETZE, APRIL]
1974 182 p In GERMAN
Avail: Issuing Activity

Daily and monthly Northern Hemisphere ground level, 850 mb, and 500 mb height and temperature analyses of constant pressure levels for April, 1974, are presented. Included scientific studies cover aspects of synoptic climatology over the Berlin sector, and data on atmospheric radioactivity and dust content.
Transl. by G.G.

N75-13479 Freie Univ., Berlin (West Germany). Inst. Fuer Meteorologie.
METEOROLOGICAL DATA. VOLUME 145 NO. 1: THE EUROPEAN CLIMATOLOGY 1974 METEOROLOGICAL SATELLITE DATA FROM THE BERLIN ZONE OF RECEPTION, PART 1, 1ST QUARTER [METEOROLOGISCHE ABHANDLUNGEN. BAND 145, HEFT 1: DAS EUROPAEISCHE WETTERBILD 1974, WETTERSATELLITEN-DATEN AUS DEM BERLINER EMPFANGSBEREICH, TEIL 1, 1. VIERTELJAHR]
1974 199 p In GERMAN
Avail: Issuing Activity

The present volume continues the daily European weather maps for the first quarter, 1974. Collected are APT photographs from ESSA 8 and film strips from the NOAA 2 scanning radiometer.
Transl. by G.G.

N75-13480 Freie Univ., Berlin (West Germany). Inst. for Meteorology.
METEOROLOGICAL DATA. VOLUME 109, NO. 4: SURVEY ON STUDY METHODS FOR ENERGETIC SCALE-EXCHANGE EFFECTS IN THE ATMOSPHERE [METEOROLOGISCHE ABHANDLUNGEN. BAND 109, HEFT 4: UBERSICHT UEBER METHODEN ZUR UNTERSUCHUNG DER ENERGETISCHEN SCALE-WECHSELWIRKUNGEN IN DER ATMOSPHAERE]
Hans-Joachim Lange 1974 51 p refs In GERMAN; ENGLISH summary
Avail: Issuing Activity

Entropy is produced in the atmosphere by irreversible processes, although the maximum of entropy is not attained because the atmosphere continually delivers entropy into space. It is shown by a simple valuation that the extraterrestrial diabatic process, which causes the non-convective entropy transport, also builds up available potential energy. A detailed presentation of the concept of available potential energy is given, and a one dimensional spectral analysis is described. It is shown that the concept of filtering analysis is the most suitable proceeding if no statistical aspects are present.
Author

N75-13481 Freie Univ., Berlin (West Germany). Inst. for Meteorology.
METEOROLOGICAL DATA. VOLUME 118, NO. 4: DAILY AND MONTHLY 10 MILLIBAR SYNOPTIC WEATHER MAPS OF 1970 FOR THE NORTHERN HEMISPHERE, ISSUE 4, OCTOBER-DECEMBER Final Report
1972 131 p
(Contract DAJA37-72-C-3073)
Avail: Issuing Activity

Daily height and temperature analyses of constant pressure levels for three months for the whole of the Northern Hemisphere are presented, based on rawinsonde and rocketsonde data in the upper stratosphere performed with aid of a hydrostatic build-up method. The corresponding monthly mean maps, their variations, and deviations are included along with gridpoint data calculated from daily values. The stratospheric circulation of polar, middle, and tropical latitudes is also described for the period under consideration.
Author

N75-13482 Freie Univ., Berlin (West Germany). Inst. for Meteorology.
METEOROLOGICAL DATA. VOLUME 138 NO. 1: DAILY ALTITUDE MAPS OF THE 30 mb LEVEL AND MONTHLY MEAN MAPS FOR 1973, PART 1 AND 2, FIRST AND SECOND QUARTERS [METEOROLOGISCHE ABHANDLUNGEN. BAND 138, HEFT 1: TAEGLICHE HOEHENKARTEN DER 30-MB-FLAECHE SOWIE MONATLICHE MITTELKARTEN FUER DAS JAHR 1973, TEIL 1 UND 2, 1. UND 2. VIERTELJAHR]
1973 250 p In GERMAN; ENGLISH summary
Avail: Issuing Activity

The present volume continues the series of stratospheric weather maps published since 1957 in the Meteorologische Abhandlungen of the Meteorological Institute of the Free University. It contains daily height and temperature analysis of constant pressure levels for 6 months for the whole of the Northern Hemisphere, based on rawinsonde and in the upper stratosphere also on rocketsonde data and performed with the aid of a hydrostatic build-up method. The corresponding monthly mean maps, their variations and deviations are included as well as the mean gridpoint data, calculated from daily values. Moreover, the stratospheric circulation of polar, middle, and tropical latitudes is described for the period under consideration.
Author

N75-13483 Freie Univ., Berlin (West Germany). Inst. for Meteorology.
METEOROLOGICAL DATA. VOLUME 139, NO. 4: THE EUROPEAN CLIMATOLOGY, 1973. METEOROLOGICAL SATELLITE-DATA FROM THE BERLIN ZONE OF RECEPTION, PART 4, FOURTH QUARTER [METEOROLOGISCHE ABHANDLUNGEN, BAND 139, HEFT 4: DAS EUROPAEISCHE WETTERBILD 1973 WETTERSATELLITEN-DATEN AUS DEM BERLINER EMPFANGSBEREICH, TEIL 4, 4. VIERTELJAHR]
1973 202 p In GERMAN
Avail: Issuing Activity

The present volume continues the daily European weather maps for the 4th quarter in 1973. Collected are APT photographs from ESSA 8 and film strips from the NOAA 2 scanning radiometer.
Transl. by G.G.

N75-13484 Freie Univ., Berlin (West Germany). Inst. fuer Meteorologie.
METEOROLOGICAL DATA. VOLUME 141, NO. 1: RESULTS OF THE SYNOPTIC SERVICE DURING 1974. DAILY AND MONTHLY WEATHER MAPS (GROUND, 850 mb, 500 mb). TABLES AND BRIEF SCIENTIFIC ARTICLES, JANUARY
1974 179 p In GERMAN
Avail: Issuing Activity

Daily and monthly Northern Hemisphere ground level, 850 mb and 500 mb height and temperature analyses of constant pressure levels for January 1974 are presented. Included scientific studies cover aspects of synoptic climatology over the Berlin sector, data on atmospheric radioactivity and dust content, and observations on wind velocities.
Transl. by G.G.

N75-13485 Freie Univ., Berlin (West Germany). Inst. fuer Meteorologie.
METEOROLOGICAL DATA. VOLUME 141, NO. 2: RESULTS OF THE SYNOPTIC SERVICE DURING 1974. DAILY AND MONTHLY WEATHER MAPS (GROUND, 850 mb, 500 mb). TABLES AND BRIEF SCIENTIFIC ARTICLES, FEBRUARY
1974 175 p ref In GERMAN
Avail: Issuing Activity

Daily and monthly Northern Hemisphere ground level, 850 mb, and 500 mb height and temperature analyses of constant pressure levels for February 1974 are presented. Included scientific studies cover aspects of synoptic climatology over the Berlin sector, data on atmospheric radioactivity and dust content, precipitation distribution, and a hurricane description.
Transl. by G.G.

N75-13486 Freie Univ., Berlin (West Germany). Inst. for Meteorology.
METEOROLOGICAL DATA. VOLUME 141, NO. 3: RESULTS OF THE SYNOPTIC SERVICE DURING 1974. DAILY AND MONTHLY WEATHER MAPS (GROUND, 850 mb, 500 mb), TABLES AND BRIEF SCIENTIFIC ARTICLES, MARCH [METEOROLOGISCHE ABHANDLUNGEN. BAND 141, HEFT 3: ERGEBNISSE DES SYNOPTISCHEN DIENSTES IM JAHRE 1974. TAEGLICHE UND MONATLICHE WETTERKARTEN (BODEN, 850 MB, 500 MB) TABELLEN UND KLEINERE WISSENSCHAFTLICHE AUFSAETZE, MAERZ]
1974 153 p In GERMAN
Avail: Issuing Activity
Daily and monthly Northern Hemisphere ground level, 850 mb, and 500 mb height and temperature analyses of constant pressure levels for March 1974 are presented. Included scientific studies cover aspects of synoptic climatology over the Berlin sector, data on atmospheric radioactivity and dust content, iceberg adrift near Newfoundland, and stagnation of the atmospheric ground layer. Transl. by G.G.

N75-13487 Rhode Island Univ., Kingston.
ESTIMATION OF WORLDWIDE THUNDERSTORM ACTIVITY FROM SCHUMANN RESONANCE DATA Ph.D. Thesis
Manfred D. Clayton 1974 93 p
Avail: Univ. Microfilms Order No. 74-16855
A method is described for determining thunderstorm activity based on the measurement of electric and magnetic fields in the ELF range from 3 to 30 hertz. A short review of the theory of Schumann resonances in the earth-ionosphere cavity is presented, and the location of major thunderstorm dipole moment on a diurnal, monthly or seasonal basis. Curves showing this activity variation based on six days of data per month, are presented for the period, September 1970 through May 1971. The computation of the activity contours from the ELF data depends upon storm locations which are also obtained from the ELP data. To insure confidence in the results thirty-one storm locations predicted by ELF data were compared with locations obtained from VLF data by other investigators. Dissert. Abstr.

N75-13488# National Environmental Satellite Service, Washington, D.C.
COMPATIBILITY OF LOW-CLOUD VECTORS AND RAWINS FOR SYNOPTIC SCALE ANALYSIS
L. F. Hubert and L. F. Whitney, Jr. Oct. 1974 31 p refs
(NOAA-Tr-NESS-70) Avail: SOD HC $0.75
Low-cloud motions derived by both manual and computer techniques from geosynchronous satellite data and rawin observations were analyzed in various combinations for a two part analysis compatibility experiment. Compatibility rather than absolute accuracy of these three data sets was examined. The intent of the first experiment was to establish a series of best analysis of the low troposphere over a large Pacific Ocean region for a 5-day period in August 1972 and to determine the compatibility of the various data sets with that series of best analysis. The second experiment concerns reanalysis of a subarea (of the experiment analysis) containing most of the rawin stations as a means to examine the compatibility of independent analysis of each data set after removing differences in sample number and distribution and while maintaining the same boundary conditions. Analyses of rawin, computer, and manual vectors differ by a 6-kt mean vector magnitude but appear to yield the same synoptic scale analyses to within a mean vector difference of 3 kt. Author

N75-13489# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
REMOTE SENSING WIND AND WIND SHEAR SYSTEM Interim Report, Apr. 1972 - Dec. 1973
Donald W. Beran Feb. 1974 113 p
(Contract DOT-FA72WAI-281)
(AD-779085; FAA-RD-74-3) Avail: NTIS HC $4.50
The background and developmental history of acoustic Doppler is presented along with a detailed study of winds that effect landing operations. A climatology of critical boundary layer wind shear and a study of optimum averaging times for reported winds indicated that the occurrence of severe wind shear is regional. Analysis of several ground based remote wind sensing devices suggested that the acoustic Doppler system is presently optimum. The selection of an optimum antenna configuration and details of the hardware used during experimental tests are discussed. Calibration of the Acoustic Doppler Wind System was accomplished by comparison with winds taken by anemometers suspended beneath balloons, tower mounted anemometers, and slow ascent radiosondes. Agreement with all of these wind measurements was very good. Results from the operational tests indicate the Acoustic Doppler System can perform in the high noise environment of an airport. Author

N75-13490# Atomic Energy Commission, Washington, D.C. Office of Regulation.
TECHNICAL BASIS FOR INTERIM REGIONAL TORNADO CRITERIA
E. H. Markee, Jr., J. G. Beckerley, and K. E. Sanders May 1974 23 p refs
(WASH-1300) Avail: NTIS HC $3.25
The objective of this study was to determine from available information a regionalized design basis tornado for the contiguous United States. From an analysis of tornado classification data from the National Weather Serivce Offices for 1971 and 1972 and tornado occurrence data, it was concluded that three general regions with associated tornado severity and frequency of occurrence could be determined. Probable windspeeds were calculated, and corresponding pressure drops and rates of pressure drop were determined from the cyclostrophic equation. The numerical values for these tornado properties are considered as conservative upper bounds. The values should be lowered as may be justified when sufficient data become available.
Author (NSA)

N75-13491# Control Data Corp., Minneapolis, Minn. Meteorology Research Dept.
SEASONAL VARIATIONS OF TROPICAL WIND SPECTRA. VOLUME 1: BASIC STATISTICAL PARAMETERS Final Report
D. G. Dartt and D. N. Hovland 15 May 1974 61 p
(Contract AT(11-1)-2153)
(COO-2153-2-Vol-1) Avail: NTIS HC $4.25
Synoptic wind spectra and horizontal and vertical cross spectra have been computed for time series from tropical stations during the interval 1964-1970. Spectral properties have been determined both for individual seasons and for seasons based on consolidated years for the 850, 500, 200, 70 and 30 mb levels. The method of spectral computations is described along with techniques that can be used for analyzing the variability of spectral properties as a function of the number of missing observations within a season. Author

N75-13492# Control Data Corp., Minneapolis, Minn. Meteorology Research Dept.
SEASONAL VARIATIONS OF TROPICAL WIND SPECTRA. VOLUME 2: ANALYSIS Final Report
D. G. Dartt and G. D. Nastrom 15 May 1974 96 p refs
(Contract AT(11-1)-2153)
(COO-2153-3-Vol-2) Avail: NTIS HC $4.75
The seasonal variation of properties of synoptic wind spectra are described from time series of rawinsonde data in the tropics. Spectral properties include total kinetic energy, ratio of meridional to zonal kinetic energy, and the slope of the spectrum for both meridional and zonal wind components. Horizontal and vertical cross spectrum properties are also examined on a regional basis. The intraseasonal variation of kinetic energy of the synoptic eddies at 850 and 200 mb is examined with respect to various properties of the seasonal flow. At 850 mb, in the easterly trades of the western Pacific, kinetic energy varies inversely with resultant wind speed and divergence. In the Caribbean during winter and spring, kinetic energy is proportional to vertical wind shear. On a global basis, kinetic energy at 200 mb is proportional to vertical

wind shear during the winter and spring seasons. Finally, a statistical diffusion model is formulated that numerically uses the spectral properties described above. Author (NSA)

N75-13493# Federal Communications Commission, Washington, D.C. Office of the Chief Engineer.
RAIN CLIMATE CONSIDERATIONS FOR DOMESTIC SATELLITES, CONTINENTAL US
Roger L. Herbstritt Nov. 1973 14 p refs
(PB-234211/1; R-7301) Avail: NTIS HC $3.25 CSCL 04B

Certain aspects of FCC Docket 19495 are discussed. The docket concerns amendments to Parts 21 and 25 of the FCC rules to establish revised earth station coordination and interference calculation methods for international and domestic communication satellite facilities by non-Government entities. In particular, the report concerns rain climate considerations for domestic satellites in the continental United States. GRA

N75-13494# National Environmental Satellite Service, Washington, D.C.
APPLICATION OF METEOROLOGICAL SATELLITE DATA IN ANALYSIS AND FORECASTING
Ralph K. Anderson, Golden R. Farr, Jerome P. Ashman, Arthur H. Smith, and Leo F. Ritter Mar. 1974 340 p refs
(AD-786137; NESC-51; AWS-212) Avail: NTIS CSCL 04/2

The report represents the combined efforts of personnel of the Applications Group, National Environmental Satellite Center (NESC), now the National Environmental Satellite Service (NESS); the Naval Air Systems Command Project FAMOS; and the Satellite Section, USAF Environmental Technical Applications Center (ETAC). Topics discussed include the following: Satellite cloud atlas and glossary; Synoptic cloud patterns; Application of satellite data to synoptic analysis in the tropics; Local phenomena; Infrared. GRA

N75-13446* Linguistic Systems, Inc., Cambridge, Mass.
ESTIMATE OF HEAT FLUXES ON THE SUBJACENT SURFACE (ACCORDING TO DATA FROM SYNOPTIC ANALYSIS)
A. P. Nagurnyy *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 112-120 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 89-95 (For availability see N75-13438 04-46)
CSCL 04B

N75-13449* Linguistic Systems, Inc., Cambridge, Mass.
THE PROBLEM OF CALCULATING CLOUD COVER IN CALCULATIONS OF LONG WAVE RADIATIONAL CHARACTERISTICS OF THE ATMOSPHERE
Z. P. Galakhov *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 159-168 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 124-130 (For availability see N75-13438 04-46)
CSCL 04A

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N75-13495*# Ohio State Univ. Research Foundation, Columbus.
MARINE GEODESY A MULTIPURPOSE APPROACH TO SOLVE OCEANIC PROBLEMS
Narendra Saxena Jul. 1974 37 p refs
(Grant NGR-36-008-093; OSURF Proj. 3820-A1)
(NASA-CR-141011; Rept-216) Avail: NTIS HC $3.75 CSCL 08E

Various current and future problem areas of marine geodesy are identified. These oceanic problem areas are highly diversified and include submersible navigation under ice seas, demarcation and determination of boundaries in deep ocean, tsunamis, ecology, etc., etc. Their achieved as well as desired positional accuracy estimates, based upon publications and discussions, are also given. A multipurpose approach to solve these problems is described. An optimum configuration of an ocean-bottom control-net unit is provided. Author

N75-13496*# Rockwell International Corp., Downey, Calif. Science Center.
MEASUREMENTS OF THE DIELECTRIC PROPERTIES OF SEA WATER AT 1.43 GHz Final Report
W. W. Ho, A. W. Love, and M. J. VanMelle Washington NASA Dec. 1974 39 p refs
(Contract NAS1-10691)
(NASA-CR-2458) Avail: NTIS HC $3.75 CSCL 08J

Salinity and temperature of water surfaces of estuaries and bay regions are determined to accuracies of 1 ppt salinity and 0.3 kelvin surface temperature. L-band and S-band radiometers are used in combination as brightness temperature detectors. The determination of the brightness temperature versus salinity, with the water surface temperature as a parameter for 1.4 GHz, is performed with a capillary tube inserted into a resonance cavity. Detailed analysis of the results indicates that the measured values are accurate to better than 0.2 percent in the electric property epsilon' and 0.4 percent in epsilon". The calculated brightness temperature as a function of temperature and salinity is better than 0.2 kelvin. Thus it is possible to reduce the measured data obtained with the two-frequency radiometer system with 1 ppt accuracy to values in the salinity range 5 to 40 ppt. Author

N75-13497# RAND Corp., Santa Monica, Calif.
ESTIMATION OF BOUNDARY CONDITIONS FOR COASTAL MODELS
S. K. Liu, J. J. Leendertse, and J. Voogt (Rijkswaterstaat) Sep. 1974 19 p refs
(P-5299) Avail: NTIS HC $3.25

Frequency response and transfer function techniques are used together with cross-spectral and fast Fourier transform methods to determine the proper boundary values for computing the flow field of a coastal sea. Tide data containing considerable perturbations from swell and meteorological disturbances are analyzed. In computing the frequency response estimates, the effect of noise in the input is treated by a cancelling technique and by the choice of a reference station to evaluate the interdependencies among the other stations at the boundary. The usefulness of the network frequency response function is threefold: (1) future conditions can be simulated using observed water levels at any single location, (2) boundary information for models of different grid size can be obtained by interpolation, and (3) missing data at a given location can be estimated optimally using data at neighboring stations and the network response function. An example of such an application, the determination of a boundary of a two-dimensional model of Jamaica Bay, New York City, U.S.A., was discussed. Author

N75-13498# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF METHODS FOR THE GEODETIC SUPPORT OF COMPLEX SEA GEOPHYSICAL SURVEYS
I. F. Glumov, V. P. Glumov, and A. V. Smirnov 10 Dec. 1974 17 p refs Transl. into ENGLISH from Izv. Vyshikh Uchebn. Zavedenii, Geod. i Aerofotosemka (Moscow), no. 3, 1974 p 17-26
(JPRS-63621) Avail: NTIS HC $3.25

Methods for determining position at sea and the range of applicability of each method in complex sea geophysical surveys are analyzed. Author

N75-13499# Washington Univ., Seattle. Dept. of Oceanography.
COLUMBIA RIVER EFFECTS IN THE NORTHEAST PACIFIC: PHYSICAL OCEANOGRAPHY Progress Report, Sep. 1971 - Jan. 1974
J. D. Smith, comp., B. Hickey, comp., and J. R. Beck, comp. 13 May 1974 397 p
(Contract AT(45-1)-2225)
(RLO-2225-T-25-12) Avail: NTIS HC $10.25

The primary effort was directed toward procuring long term series direct current measurements during the winter and summer at one station on the central continental shelf and one station on the shelf edge. The field experiments, data processing procedures, and results are discussed. NSA

N75-13500# Rhode Island Univ., Kingston. Dept. of Plant Pathology-Entomology.
PETROLEUM DEGRADATION IN LOW TEMPERATURE MARINE AND ESTUARINE ENVIRONMENTS Annual Report, 1 May 1973 - 30 Apr. 1974
Richard W. Traxler May 1974 64 p refs
(Contract N00014-68-A-0215-0013)
(AD-778687/4; Rept-98-01-4062-1) Avail: NTIS HC $4.25 CSCL 06/13

Hydrocarbon utilization profiles demonstrate some isolates able to utilize aromatic, cyclic and aliphatic hydrocarbons, some isolates able to utilize only cyclic and aliphatic hydrocarbons and other isolates only able to utilize aliphatic hydrocarbons. The isolates have been tentatively assigned to a number of different genera. Temperature studies demonstrated that the isolates are psychro-tolerant and hydrocarbons are metabolized at temperatures as low as 0C. Gas chromatographic analyses show a decrease in sediment hydrocarbons which correlates with the bacterial enrichment. (Modified author abstract) GRA

N75-13501# Virginia Inst. of Marine Science, Gloucester Point.
INVESTIGATION OF SURFACE FILMS: CHESAPEAKE BAY ENTRANCE Environmental Protection Technology Series.
William G. MacIntyre, Craig L. Smith, John C. Munday, Victoria M. Gibson, and James L. Lake Feb. 1974 179 p refs Sponsored by EPA
(PB-232968/8; W74-08831; EPA-670/2-73-099) Avail: NTIS MF $2.25, SOD HC $2.05 as EPI.23:670/2-73-099 CSCL 13B

Experimental point source oil releases have been conducted in the Chesapeake Bay mouth area. Predictions of oil slick motion were tested, and slicks were sampled and analyzed to measure their aging rates over periods up to 32 hours. Remote sensing techniques were used to detect and measure the spreading rate of oil. Some laboratory oil film aging experiments were done to further document and elucidate aging processes. Results indicate a reasonable motion prediction, an explanation of the non-biological initial aging of oil films, and a fair corroboration of a theoretical oil spreading model. Indigenous surface films in the study area were analyzed for lipid and chlorinated hydrocarbon content. GRA

N75-13447* Linguistic Systems, Inc., Cambridge, Mass.
A SMALL PARAMETER MODEL OF CIRCULATION IN A HOMOGENEOUS BAROCLINIC OCEAN
Ye. P. Borisenkov *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of The Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 121-144 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 96-113 (For availability see N75-13438 04-46)
CSCL 08C

N75-13448* Linguistic Systems, Inc., Cambridge, Mass.
THE PROBLEM OF THE INFLUENCE OF OCEAN CURRENTS ON FREE INTERNAL GRAVITY WAVES
V. G. Savchenko and Z. R. Fuks *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 145-158 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 114-123 (For availability see N75-13438 04-46)
CSCL 08C

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N75-13502* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
AUTOMATIC INOCULATING APPARATUS Patent
Judd R. Wilkins and Stacey M. Mills, inventors (to NASA) Issued 26 Nov. 1974 10 p Filed 24 Jan. 1973 Supersedes N73-16096 (11 - 07, p 0750)
(NASA-Case-LAR-11074-1; US-Patent-3,850,754; US-Patent-Appl-SN-326364; US-Patent-Class-195-127-; US-Patent-Class-195-120; US-Patent-Class-115-103.5) Avail: US Patent Office CSCL 06B

An automatic inoculating apparatus for agar trays is described and using a simple inoculating element, such as a cotton swab or inoculating loop. The apparatus includes a movable carriage for supporting the tray to be inoculated, a drive motor for moving the tray along a trackway, and a swabbing motor for automatically swabbing the tray during the movement. An actuator motor controls lowering of the inoculating element onto the tray and lifting of the inoculating element. An electrical control system, including limit microswitches, enables automatic control of the actuator motor and return of the carriage to the initial position after inoculating is completed.
Official Gazette of the U.S. Patent Office

N75-13503*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BESMEX: BERING SEA MARINE MAMMAL EXPERIMENT
G. Carleton Ray and Douglas Wartzok Oct. 1974 55 p refs Prepared in cooperation with Johns Hopkins Univ. Original contains color illustrations
(NASA-TM-X-62399) Avail: NTIS HC $4.25 CSCL 06C

Predictive ecological models are being studied for the management and conservation of the walrus, and the bowhead whale in the Bering Sea. The influence of sea ice on the distribution, and carrying capacity of the area for these two mammals is to be investigated with the primary target species being the walrus. Remote sensing and radio tracking is considered a requirement for assessing the walrus ecosystem. F.O.S.

N75-13504*# General Electric Co., Philadelphia, Pa. Space Div.
AUTOMATED BIOWASTE SAMPLING SYSTEM IMPROVED FECES COLLECTION, MASS MEASUREMENT AND SAMPLING Final Report
G. L. Fogal, J. K. Mangialardi, and R. Young Sep. 1974 150 p
(Contract NAS1-11443)
(NASA-CR-140376; DOC-74SD4248) Avail: NTIS HC $5.75 CSCL 06I

The capability of the basic automated Biowaste Sampling System (ABSS) hardware was extended and improved through the design, fabrication and test of breadboard hardware. A preliminary system design effort established the feasibility of integrating the breadboard concepts into the ABSS. Author

N75-13505*# General Electric Co., Philadelphia, Pa. Space Div.
AUTOMATED BIOWASTE SAMPLING SYSTEM, SOLIDS SUBSYSTEM OPERATING MODEL, PART 2 Final Report
G. L. Fogal, J. K. Mangialardi, and R. E. Stauffer Nov. 1973 148 p
(Contract NAS1-11443)
(NASA-CR-140378; DOC-74SD4208-Pt-2) Avail: NTIS HC $5.75 CSCL 06I

The detail design and fabrication of the Solids Subsystem were implemented. The system's capacity for the collection, storage or sampling of feces and vomitus from six subjects was tested and verified. N.R.

N75-13506*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
WATER PURIFICATION PROCESS Patent Application
John R. Hollahan and Theodore Wydeven, inventors (to NASA) Filed 6 Nov. 1974 15 p
(NASA-Case-ARC-10643-2; US-Patent-Appl-SN-521619) Avail: NTIS HC $3.25 CSCL 06I

A reverse osmosis process for the purification of water is presented wherein a saline solution is placed under pressure

against a polymeric membrane supported by a microporous inert support. Salt and other impurities collect on one side of the membrane and purified water on the other. The membrane is made by a process wherein an allyl amine or similar compound is polymerized as a thin film in the presence of a plasma discharge. These films showed outstanding properties as reverse osmosis membranes. The membranes are formed essentially in the absence of air under conditions where few, if any, defects are produced. The most outstanding feature of the membranes is that they can be stored under ordinary ambient, dry conditions. NASA

N75-13507*# Kanner (Leo) Associates, Redwood City, Calif.
BACTERIAL CONTAMINATION OF INDOOR AIR AS A FUNCTION OF AIR EXCHANGE
H. J. Russenberger and H. U. Wanner Washington NASA Dec. 1974 7 p Transl. into ENGLISH from Zentrabl. Bakteriol. Parasitenk., Abt. 1 Orig. (East Germany), A 227, 1974 p 564-567
(Contract NASw-2481)
(NASA-TT-F-16084) Avail: NTIS HC $3.25 CSCL 06M

Airborne bacteria counts were taken in operating rooms with natural ventilation and with ventilation systems producing hourly air exchange rates of 12x and 20x; the average counts were about 700, 300 and 60 bacteria/cu m, respectively. An operating cubicle with a low-turbulence displacement system produced a zero bacteria count. Tests in a climate chamber with a variable air exchange rate showed an appreciable reduction in bacteria count resulting when air exchange rate was increased to 25 1/h. Author

N75-13508*# Georgetown Univ., Washington, D.C. Dept. of Biology.
DIFFERENTIAL ELECTROPHORETIC SEPARATION OF CELLS AND ITS EFFECT ON CELL VIABILITY Final Report
Esther M. Leise and Frances Lesane Dec. 1974 20 p refs
(Contract NAS8-29778)
(NASA-CR-120553) Avail: NTIS HC $3.25 CSCL 06M

An electrophoretic separation method was applied to the separation of cells. To determine the efficiency of the separation, it was necessary to apply existing methodology and develop new methods to assess the characteristics and functions of the separated subpopulations. Through appropriate application of the widely used isoelectric focusing procedure, a reproducible separation method was developed. Cells accumulated at defined pH and 70-80% remained viable. The cells were suitable for further biologic, biochemical and immunologic studies. Author

N75-13509*# Research Triangle Inst., Research Triangle Park, N.C.
APPLICATIONS OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE Final Report, Sep. 1973 - Aug. 1974
J. N. Brown Aug. 1974 94 p
(Contract NASw-2459)
(NASA-CR-141113) Avail: NTIS HC $4.75 CSCL 06B

The results of the medically related activities of the NASA Application Team Program at the Research Triangle Institute are presented. The RTI team, a multidisciplinary team of scientists and engineers, acted as an information and technology interface between NASA and individuals, institutions, and agencies involved in biomedical research and clinical medicine. The Team has identified 40 new problems for investigation, has accomplished 7 technology applications, 6 potential technology application, 4 impacts, has closed 54 old problems, and has a total of 47 problems under active investigation. Author

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N75-13510 Michigan Univ., Ann Arbor.
A DISCRETE-PARAMETER HEAD INJURY MODEL Ph.D. Thesis
Nabih Mohammed Alem 1974 204 p
Avail: Univ. Microfilms Order No. 74-25132

The mechanics of head injury and some current techniques and models for its assessment, under limited impact conditions, are discussed. Based on the hypothesis that injury results from a combination of displacement and rotation of the brain inside the skull, a head injury model is proposed. The model is a 12-degree-of-freedom mechanical system consisting of masses, dashpots and springs. The classical Lagrange's method is used in formulating the equations of motion. The solution is obtained by numerical integration. The frequency- and time-responses of the model, for a variety of loading conditions, are studied. Results show a good agreement between experimentally observed and mathematically generated responses. Dissert. Abstr.

N75-13511# Istituto Superiore di Sanita, Rome (Italy).
HEALTH ASPECTS OF RADIO-FREQUENCY ELECTROMAGNETIC RADIATION
M. Grandolfo 3 Apr. 1974 31 p refs In ITALIAN; ENGLISH summary
(ISS-L-74/3) Avail: NTIS HC $3.75

Many of the nonionizing electromagnetic radiation at certain frequencies, power levels, and exposure durations can produce biological effects or injury depending on multiple physical and biological variables. The pathophysiology is reviewed of exposure to microwaves and radio frequency radiation, and the protection guides which have been established for these waves in many countries and organizations. Author

N75-13512*# Kanner (Leo) Associates, Redwood City, Calif.
RESEARCH ON COLD STERILIZATION WITH FORMALIN VAPORS
W. Adam Washington NASA Dec. 1974 10 p refs Transl. into ENGLISH from Zentrabl. Bakteriol. Parasitenk., Abt. 1 Orig. (East Germany), A 227, 1974 p 477-481
(Contract NASw-2481)
(NASA-TT-F-16085) Avail: NTIS HC $3.25 CSCL 06E

The sterilization efficacy of formalin vaporized in a 20 liter sterilizer operated at 70 F is compared with that of ethylene oxide, using spores of B. subtilis. Neither produces good results with tap water with spore counts higher than 100. The two agents are roughly equivalent in killing spores in alcohol/blood specimens; formalin is superior for spores in physiological saline. Spores in cloth pads saturated with blood and dried are shown to be more resistant to formalin. The latter test is recommended for formalin sterilization apparatus. Author

N75-13513*# Kanner (Leo) Associates, Redwood City, Calif.
NAD- AND NADP-DEPENDENT DEHYDROGENASE ACTIVITIES IN ERYTHROCYTES UNDER EXPERIMENTAL HYPOXIA
M. M. Epshteyn, V. A. Nikonova, Z. I. Spilioti, and N. B. Kakhnover Washington NASA Dec. 1974 8 p refs Transl. into ENGLISH from Ukr. Biokhim. Zh. (Kiev), v. 46, no. 5, Sep.-Oct. 1974 p 564-567
(Contract NASw-2481)
(NASA-TT-F-16095) Avail: NTIS HC $3.25 CSCL 06E

The activity of some NAD- and NADP-dependent enzymes in rat erythrocytes was studied under hypoxic hypoxia and adrenal myocarditis. It is shown that under acute hypoxic hypoxia the activity of glucose-6-phosphate-dehydrogenase in a nucleus free erythrocyte is inhibited reversibly, the glutathione reductase activity immediately connected with the former being unchanged. The activity of lactate dehydrogenase increased. Under a considerable dose of adrenalin, the activity of glutathione reductase rose. Thus, under acute hypoxia, the ratio between the aerobic and anaerobic pathways of energy formation in the erythrocyte is disturbed in favor of the anaerobic pathway. Author

N75-13514*# Kanner (Leo) Associates, Redwood City, Calif.
EFFECT OF HYPEROXIA ON HEMOGLOBIN, SERUM PROTEIN AND GAS METABOLISM IN ADRENALECTOMIZED RATS
V. P. Dudarev Washington NASA Dec. 1974 10 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), no. 3, May-Jun. 1974 p 39-43
(Contract NASw-2481)
(NASA-TT-F-16094) Avail: NTIS HC $3.25 CSCL 06E

Increased oxygen pressure (1, 2 and 3 gage atm) for 15 to

17 days, one hour each day, caused statistically unreliable shifts in erythrocyte and hemoglobin content in intact rats, whereas a 16.3% decrease in peripheral blood erythrocyte content and a 14.8% decrease in hemoglobin were observed in adrenalectromized rats. Both increased oxygen pressure and adrenalectomy tended to decrease hemoglobin I, II, III and IV fraction content. In adrenalectomized rats, fraction III rose only during 1 and 2 gage atm. Both adrenalectomized and intact rats developed dysproteinema during adaptation to hyperoxia. Author

N75-13515*# Kanner (Leo) Associates, Redwood City, Calif.
THE EFFECT OF CAFFEINE UPON BLOOD GLUCOSE LEVEL
J. Hankiewicz Washington NASA Dec. 1974 12 p refs Transl. into ENGLISH from Pol. Tyg. Lek. (Poland), v. 15, 1960 p 742-745
(Contract NASw-2481)
(NASA-TT-F-16049) Avail: NTIS HC $3.25 CSCL 06E

Caffeine, administered by different routes to normal and diabetic patients in 0.07 to 0.16 g doses, decreased blood glucose by 11.6 and 13.3 mg-%, respectively, after 30 to 5 min for parenteral or 45 to 50 min for oral administration. The effect was proportional to the dosage and was the greater the higher the initial hyperglycemia. Author

N75-13516# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
ENERGY EXPENDITURE OF INFANTRY PATROLS DURING AN ARCTIC WINTER EXERCISE
C. L. Allen and W. J. OHara Dec. 1973 9 p
(DCIEM-73-R-985) Avail: NTIS HC $3.25

The energy expenditure of infantry troops participating in winter training exercises at Churchill and Frobisher Bay, Canada were monitored. Twenty-seven personnel comprising three tent groups were studied as they carried out the normal tasks of living in tents and moving on foot. Mechanical transport and laboratory facilities were available at Churchill where, direct measurements with the Kofranyi-Michaelis respirometer were obtained as the personnel carried out their training assignments including cross country patrols up to 6000 metres a day. Close observation and diaries were used to assess the energy expenditures of the same personnel at Frobisher Bay. A gross energy cost of 3484 Kcal per man per day was calculated from these data. The ration provided 3600 Kcal, enough to maintain caloric balance although there were significant changes in body composition. Author

N75-13517# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
PHYSICAL FITNESS AND TOLERANCE TO ENVIRONMENTAL STRESSES: A REVIEW OF HUMAN RESEARCH ON TOLERANCE TO AND WORK CAPACITY IN HOT, COLD AND HIGH ALTITUDE ENVIRONMENTS
W. S. Myles and A. K. Chin Feb. 1974 17 p refs
(DCIEM-74-R-1008) Avail: NTIS HC $3.25

The relation between physical fitness and tolerance to heat, cold, and high altitude was examined and it was found that work-heat tolerance for periods of two hours or less in both dry and humid heat is increased by physical conditioning; the benefits are less obvious for longer exposures. Field and laboratory studies clearly indicate that physical fitness is not a complete substitute for acclimatization. It seems possible that fit individuals acclimatize more readily and safely to heat. Physical conditioning opposes one effect of altitude which is to decrease maximum aerobic power, but physically fit individuals do not appear to be any less susceptible to acute mountain sickness. Cold tolerance is commonly assessed in nude subjects and the evidence is conflicting concerning the benefits of physical conditioning. On balance, however, it does not appear that the thermoregulatory response to cold is improved by superior physical fitness. Evidence is lacking which is pertinent to the realistic situation where a man is fully clothed at work and at rest in the cold. Author

N75-13518*# Kanner (Leo) Associates, Redwood City, Calif.
PROBLEMS OF SPACE BIOLOGY. VOLUME 25: DECOMPRESSION DISORDERS
P. M. Gramenitskiy Washington NASA Dec. 1974 356 p refs Transl. into ENGLISH from the monograph "Problemy Kosmicheskoy Biologii. Tom Dekompressionnyye Rasstroystva" Moscow, Nauka Press, 1974 349 p
(Contract NASw-2481)
(NASA-TT-F-15970) Avail: NTIS HC $10.00 CSCL 06E

The monograph describes the problems of decompression disorders: The functional disturbances arising in the organism as the result of the formation of gas bubbles in the blood and tissues incident to decompression. The author and his colleagues present experimental data gathered in the course of many years of systematic study of why and how decompression disorders develop in man and animals after a stay under increased pressure or upon transition to a rarefied atmosphere. The general principles governing the development of decompression disturbances and the role of aeroembolism in their pathogenesis, are expressed. The existence in the organism of defense reactions against aeroembolism is established, as well as the possiblity of enhancing the organism's resistance to decompression effects. Conclusions of value to deep-sea diving and to the caisson method of construction work under water are inserted, as well as experimental data on how to ensure decompression disorder prophylaxis on space flights. Author

N75-13519# Civil Aeromedical Inst., Oklahoma City, Okla. Medical Statistical Section.
CHARACTERISTICS OF MEDICALLY DISQUALIFIED AIRMAN APPLICANTS DURING CALENDAR YEAR 1971
Charles F. Booze, Jr. May 1974 18 p refs
(AD-781648; FAA-AM-74-5) Avail: NTIS HC $3.00

Medical and general descriptive characteristics of airmen medically disqualified are quantified. Descriptive data concerning age, sex, occupation, class of medical certificate applied for, cause-specific denial rates, and total flying time for medically disqualified applicants are presented. The overall denial rate was 9.5 per 1000 applicants. Higher age intervals contributed more to denials than would be expected. Eighty-seven percent of all denied applicants were not occupationally connected to aviation. Fifty-seven percent had less than 40 hours total flight experience. Cardiovascular, neuropsychiatric, and miscellaneous pathology were the most significant causes for denial. Author

N75-13520# Civil Aeromedical Inst., Oklahoma City, Okla.
AMPLITUDE/FREQUENCY DIFFERENCES IN A SUPINE RESTING SINGLE LEAD ELECTROCARDIOGRAM OF NORMAL VERSUS CORONARY HEART DISEASED MALES
Michael T. Lategola and Peter J. Layne (MarDen Enterprises, Las Cruces, N. Mex.) May 1974 33 p refs
(AD-781685; FAA-AM-74-6) Avail: NTIS HC $3.25

Research aimed at improved screening detection of CHD evaluated amplitude/frequency analysis of high fidelity ECG recordings. Thirty normal males and 30 with documented CHD were selected. Analog ECGs were obtained using electromagnetic tape recording. Two bipolar leads were recorded during supine rest. An analysis system provided for digital conversion, division of whole electrocardiac cycles into four defined segments, time-normalization of each segment, and amplitude/frequency analysis. The results from the CM sub 5 lead recorded at supine rest are presented. Comparison of the normal versus CHD groups across the 30-subject average amplitude values for each of 200 harmonics per segment revealed significant differences at most of the 200 harmonics. Two criteria, based only on the maximum and minimum amplitude values for each of the 200 harmonics, succeeded in individual screening separation of the normal CHD males. Author

N75-13521# Civil Aeromedical Inst., Oklahoma City, Okla.
EFFECTS OF SECOBARBITAL AND D-AMPHETAMINE ON TRACKING PERFORMANCE DURING ANGULAR ACCELERATION
David J. Schroeder, William E. Collins, and Gary W. Elam (Oklahoma Univ., Oklahoma City) Dec. 1973 12 p refs
(AD-777582; FAA-AM-73-17) Avail: NTIS HC $3.00

Thirty young men were randomly assigned in equal numbers to one of the following groups: placebo secobarbital (100 mg), or d-amphetamine (10 mg). The drugs or placebo were administered in capsules in a double-blind procedure following practice at a tracking task and baseline determinations of tracking performance levels in both static (stationary)

and dynamic (angular acceleration) conditions. With the rotator stationary, d-amphetamine subjects performed significantly better than controls. However, during angular acceleration, secobarbital subjects made significantly more tracking errors and had significantly more vestibular nystagmus than both the control and the d-amphetamine groups for all postdrug sessions. These findings agree with our previous studies of alcohol effects: depressant drugs may have little or no deleterious influence on tracking performance in static environments, but may produce marked performance degradation during angular motion. Author

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N75-13522# Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Lab.

SIMULATOR EVALUATION OF PILOT ASSURANCE DERIVED FROM AN AIRBORNE TRAFFIC SITUATION DISPLAY. PHASE 2: TRAFFIC AWARENESS IMPROVEMENT Final Project Report, 1 Mar. 1972 - 30 Jun. 1973

David Melanson Jul. 1973 241 p refs

(Contracts DOT-FA71WAI-234; Contract F19628-70-C0230) (AD-778951; FAA-EM-74-10) Avail: NTIS HC $6.00

Forty-four professional pilots participated in a number of simulation experiments designed to measure pilot awareness using today's partly line voice communications and a possible future system employing the ATSD. Tests were run with and without an in-trail spacing task and with one and two-man flight crews. In addition, a pilot's ability to detect and react to conflict situations was measured during both single and parallel runway operations. The effects of conflict alarms and the frequency of updating information were also examined. All Experiments were conducted in a fixed-based simulator configured as a Boeing 707. The ATSD was found to be superior to the party-line communication channel as a source of traffic awareness. With no spacing task, the detection of conflicts prior to the point of closest approach occurred in all cases employing the ATSD regardless of whether an alarm was used or whether a crew or single pilot was being tested. With a spacing task, a high percentage of the conflicts were detected by single pilots, but not always in time to take safe evasive action, particularly during closely-spaced parallel approaches. Tau (range divided by range rate) alarms reduce the reaction time of both crews and single pilots in responding to conflicts in some, but not all, conflicts. Author

N75-13523*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

A MODEL AND PREDICTIVE SCALE OF PASSENGER RIDE DISCOMFORT

Thomas K. Dempsey Dec. 1974 30 p refs

(NASA-TM-X-72623) Avail: NTIS HC $3.75 CSCL 05E

A model to define the interrelationship of the various factors (vibratory and nonvibratory) important to passenger comfort, in realistic transport vehicle vibration environments was developed. The model represents: (1) a framework for the investigation of comfort within diverse transportation vehicles; (2) a mechanism for the development of a scale of comfort; (3) a mechanism through which design criteria can be obtained for improving the rideability of current and future transportation vehicles; and (4) a tool for obtaining information for the maximization of passenger ride quality, based upon sociological and psychological information. The application of the model is based upon the computational steps necessary for derivation of the comfort scale. The emphasis within the scale is upon the summation of comfort units; the summation being obtained through the use of appropriately determined factors, both within and between axes. Author

N75-13524*# Scientific Translation Service, Santa Barbara, Calif.

THE CENTRAL AND PERIPHERAL VISUAL ACUITY OF THE LIGHT-ADAPTED AND DARK-ADAPTED EYE

E. W. Katzenellenbogen Washington NASA Dec. 1974 28 p refs Transl. into ENGLISH from Psychologische Studien (Leipzig), v. 3, 1907 p 272-293

(Contract NASw-2483)

(NASA-TT-F-16068) Avail: NTIS HC $3.75 CSCL 05E

Light adapted vision is sharper and fatigues less. The effect of peripheral angles of vision is determined. Author

N75-13525# Militaerpsykologiska Institutet, Stockholm (Sweden).

JUDGEMENT OF DISTANCE OVER GROUND AND IN PHOTOGRAPHS [BEDOEMNING AV AVSTAND I TERRAENG OCH PA FOTO ETT FOERFOERSOEK]

Henry Widen Nov. 1972 24 p refs In DANISH

(B-80) Avail: NTIS HC $3.25

A laboratory technique was studied for visuo-spatial judgments where terrain effects can be considered. Twelve persons made judgements of 18 different distances over ground, the distances ranging from 55 to 1850 meters. The objects to be judged were photographed and the same 12 persons made binocular judgments with the area of vision restricted to projected photographs where the visual angles of the objects to be judged were the same as in the out door task. The results show a correlation of .75 between judgments under the two conditions and larger error of judgment in photograph judgments in the shortest and the longest distances. The lack of agreement in the shorter distances is probably due to the fact that binocular stereopsis was effective in judgments over ground but not in the photographs, whereas the cause in the longest distances probably is the poor resolution of the photographs relative to the resolution capacity of the eye. Author

N75-13526# Civil Aeromedical Inst., Oklahoma City, Okla.

JOB-RELATED ATTITUDES OF NON-JOURNEYMAN FAA AIR TRAFFIC CONTROLLERS AND FORMER CONTROLLERS: A SEX COMPARISON

John J. Mathews, William E. Collins, and Bart B. Cobb Aug. 1974 26 p refs

(AD-787238; FAA-AM-74-7) Avail: NTIS HC $3.25

Recent Air Traffic Control (ATC) attrition rates showed no sex differences in the proportion of trainees completing FAA Academy training; however, the percentage of women who subsequently left ATC work was twice that of men. Questionnaires concerning aspects of job-related attitudes were given to 56 males and 56 females former trainees (attritions) who were matched on several variables, and also to a sample of controllers (63 women and 63 matched men) who entered training at the same time as the attritions, but who were still in ATC work (retentions). Over half the attritions and less than a third of the retentions thought training was too hurried and not adequate. Among women, more attritions (38%) then retentions (18%) felt shift work was not desirable. About one-third of male attritions but less than one-sixth of male retentions viewed the work as routine and not pleasant. Author

N75-13527# Civil Aeromedical Inst., Oklahoma City, Okla.

PERSONALITY AND PHYSIOLOGICAL CORRELATES OF PERFORMANCE DECREMENT ON A MONOTONOUS TASK REQUIRING SUSTAINED ATTENTION

Richard I. Thackray and Robert M. Touchstone Dec. 1973 18 p refs

(AD-777825; FAA-AM-73-14) Avail: NTIS HC $3.00

A serial reaction task was used to study possible personality, as well as physiological, correlates of individual differences in performance decrement under low task load conditions. Sixty subjects performed the task continuously for 40 minutes. Extraverted subjects showed increasing lapses of attention, while introverted subjects failed to show any evidence of a decline in attention. Of the two extraversion components (impulsivity and sociability), impulsivity was the component responsible for the obtained decrement. Heart rate variability showed a significant relationship with performance decrement while mean heart rate did not. Author

N75-13528# Civil Aeromedical Inst., Oklahoma City, Okla.

SUSCEPTIBILITY TO ANXIETY AND SHIFT DIFFICULTY AS DETERMINANTS OF STATE ANXIETY IN AIR TRAFFIC CONTROLLERS

Roger C. Smith and C. E. Melton, Jr. Dec. 1973 6 p refs

(AD-777565; FAA-AM-73-15) Avail: NTIS HC $3.00

The State-Trait Anxiety Inventory (STAI) was used to assess

the anxiety of air traffic controllers who had experienced difficult and easy work shifts. Eighty volunteers completed the STAI before and after two or more eight- hour work shifts. Controllers relatively high in anxiety proneness tended to report higher levels of anxiety in association with control work than those relatively low in anxiety proneness. The mean A-state score after shifts was higher than the mean score before shifts. It was also determined that the increase in anxiety during shifts was greater for difficult shifts. Author

N75-13529# Civil Aeromedical Inst., Oklahoma City, Okla.
UTILITY OF SEVERAL CLINICAL TESTS OF COLOR DEFECTIVE VISION IN PREDICTING DAYTIME AND NIGHTTIME PERFORMANCE WITH THE AVIATION SIGNAL LIGHT GUN
Jo Ann Steen, William E. Collins, and Mark F. Lewis Dec. 1973 19 p refs
(AD-777563; FAA-AM-73-18) Avail: NTIS HC $3.00

Subjects of varying type and degree of color deficiency were tested on a battery of color tests. Correlations with a daytime and nighttime practical test of the ability of subjects to discriminate aviation signal red, white, and green were obtained. The results indicate that color defective people can identify flashes from a signal light gun better at night than during the day. It was also found that the Farnsworth Lantern, the SAM Color Threshold Tester, the two sets of A O Plates, and the Dvorine Plates were among the best predictors of performance on the practical test. Author

N75-13530# Human Engineering Labs., Aberdeen Proving Ground, Md.
LACK OF APPETITIVE AROUSAL EFFECTS ON SENSORY PROCESSING OF AUDITORY EVOKED POTENTIALS Final Report
Lynn C. Oatman Jun. 1974 32 p refs
(AD-785541; HEL-TM-12-74) Avail: NTIS CSCL 05/10

The purpose of the present report is to investigate the selective processes within the central nervous system where relevant sensory information is perceived while irrelevant information is rejected. Three experiments were conducted to examine whether irrelevant auditory information is rejected in the unanesthetized cat, with middle-ear muscles cut, during food deprivation. Since food deprivation can produce a state of heightened EEG arousal, this increased arousal can result in the activation of the inhibitory mechanisms and produce attenuation of click-evoked potentials in the auditory pathways. The results consistently show that increased food deprivation had no significant arousal effects or changes in the click-evoked responses recorded along the auditory pathway. Author (GRA)

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N75-13531* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CIRCUIT FOR DETECTING INITIAL SYSTOLE AND DICROTIC NOTCH Patent
Vernon D. Gebben and John A. Webb, Jr., inventors (to NASA) Issued 26 Nov. 1974 7 p Filed 30 Jan. 1973 Supersedes N73-18139 (11 - 09, p 0997)
(NASA-Case-LEW-11581-1; US-Patent-3,850,169; US-Patent-Appl-SN-327921; US-Patent-Class-128-2.05P; US-Patent-Class-128-2.05A) Avail: US Patent Office CSCL 06B

Circuitry is disclosed for processing an arterial pressure waveform to produce during any one cycle a pulse corresponding to the initial systole and a pulse corresponding to the dicrotic notch. In a first channel, an electrical analog of the arterial pressure waveform is filtered and then compared to the original waveform to produce an initial systole signal. In a second channel, the analog is differentiated, filtered, and fed through a gate controlled by pulses from the first channel to produce an electrical pulse corresponding to the dicrotic notch.
Official Gazette of the U.S. Patent Office

N75-13532*# Connecticut Univ., Storrs. Dept. of Pathobiology.
STUDIES ON DISEASE TRANSMISSION IN SPACECRAFT ENVIRONMENTS Final Report
Alan J. Kenyon Oct. 1974 145 p Original contains color illustrations
(Contract NAS9-11941)
(NASA-CR-140372) Avail: NTIS HC $5.75 CSCL 06E

The effects of the Skylab gas mixtures on general health and immunocompetence of mice and ferrets subjected to the Skylab space cabin environment (SCE) were initially studied in a stainless steel low pressure facility which was maintained at gas ratios of 30% nitrogen and 70% oxygen under 5 psia, and which consisted of two subchambers, that permitted mutual isolation of experimental groups and/or selective removal of animals without return of the entire cabin to ambient pressure was developed. The studies demonstrated that ferrets immunized with Brucella Strain 19 prior to being housed in SCE had decreased synthesis of IgG compared to their respective controls. The possibility of latent infections being responsible for stress-induced upper respiratory diseases of astronauts required that the role of neutralizing antibody as a function of antibody affinity/avidity be investigated. The model consisted of Aleutian disease virus (ADV) which infects ferrets and mink resulting in nonneutralized immune complexes. These studies demonstrated that early antibody to ADV had lower affinity/avidity than late antibody with respect to chronicity. These studies culminated in a description of antibody affinity, first isolation of ADV and its cultivation in vitro. Author

N75-13533*# General Electric Co., Philadelphia, Pa. Space Div.
AUTOMATED BIOWASTE SAMPLING SYSTEM URINE SUBSYSTEM OPERATING MODEL, PART 1 Final Report
G. L. Fogal, J. K. Mangialardi, and F. Rosen Nov. 1973 224 p
(Contract NAS1-11443)
(NASA-CR-140377; DOC-74SD4208-Pt-1) Avail: NTIS HC $7.25 CSCL 06I

The urine subsystem automatically provides for the collection, volume sensing, and sampling of urine from six subjects during space flight. Verification of the subsystem design was a primary objective of the current effort which was accomplished thru the detail design, fabrication, and verification testing of an operating model of the subsystem. Author

N75-13534*# National Aeronautics and Space Administration Lyndon B. Johnson Space Center, Houston, Tex.
SELF-CONTAINED BREATHING APPARATUS Patent Application
John L. Sullivan (Scott Aviation Corp., Lancaster, N. Y.), Eugene A. Giorgini (Scott Aviation Corp., Lancaster, N. Y.), and Milo R. Simmonds, inventors (to NASA) (Scott Aviation Corp., Lancaster, N. Y.) Filed 11 Nov. 1974 12 p
(Contract NAS9-13177)
(NASA-Case-MSC-14733-1; NASA-Case-MSC-14735-1; US-Patent-Appl-SN-522971) Avail: NTIS HC $3.25 CSCL 06K

A self-contained breathing apparatus with automatic redundant fluid pressure controls is presented along with a self-contained breathing apparatus having a facemask respirator, automatic redundant fluid pressure controls, and a fluid-actuated alarm. The automatic redundant pressure controls provide alternate lines of fluid communication in the event of failure of the primary pressure reducer or depletion of the supply of gas to a low level. A fluid-actuated alarm, located in the facemask to avoid wasteful exhausting of the gas, signals either depletion of the supply of gas or a failure closed condition of the primary reducer. NASA

N75-13535*# ILC Industries, Inc., Dover, Del.
APOLLO/SKYLAB SUIT PROGRAM-MANAGEMENT SYSTEMS STUDY, VOLUME 1
M. McNiff 30 Apr. 1974 254 p
(Contract NAS9-6100)

(NASA-CR-140368; SES-074-101-Vol-1) Avail: NTIS HC $8.50 CSCL 06K

A management systems study for future spacesuit programs was conducted to assess past suit program requirements and management systems in addition to new and modified systems in order to identify the most cost effective methods for use during future spacesuit programs. The effort and its findings concerned the development and production of all hardware ranging from crew protective gear to total launch vehicles. Author

N75-13536*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AUTOMATIC BIOWASTE SAMPLING Patent Application
G. L. Fogal (GE) and Richard L. Sauer, inventors (to NASA) Filed 22 Nov. 1974 18 p
(Contract NAS1-11443)
(NASA-Case-MSC-14640-1; US-Patent-Appl-SN-526449) Avail: NTIS HC $3.25 CSCL 14B

A sampling system for acquiring biowaste samples in a space craft is reported; the automatic biowaste system for sampling and disposal of feces and vomitus includes a storage container and an associated seat. The storage container has a slide valve which is releasably locked in positions placing the seat into and out of communication with the container. A passage from the seat leads to a rotating platform with peripherally located vertical tines. The rotating platform disperses waste radially. A retrievable, porous sampling strip is insertable about the periphery of the rotating platform and is retractable into a separate sampling container. The sampling strip is retrievable into a plastic storage container for subsequent analysis. NASA

N75-13537*# Martin Marietta Corp., Denver, Colo.
UTILIZATION OF IMMOBILIZED UREASE FOR WASTE WATER TREATMENT Final Report
Richard R. Husted Dec. 1974 44 p refs
(Contract NAS2-8165)
(NASA-CR-137596) Avail: NTIS HC $3.75 CSCL 06I

The feasibility of using immobilized urease for urea removal from waste water for space system applications is considered, specifically the elimination of the urea toxicity problem in a 30-day Orbiting Frog Otolith (OFO) flight experiment. Because urease catalyzes the hydrolysis of urea to ammonia and carbon dioxide, control of their concentrations within nontoxic limits was also determined. The results of this study led to the use of free urease in lieu of the immobilized urease for controlling urea concentrations. An ion exchange resin was used which reduced the NH3 level by 94% while reducing the sodium ion concentration only 10%. Author

N75-13538# Kansas State Univ., Manhattan. Inst. for Systems Design and Optimization.
COMPUTER SIMULATION OF OPTIMAL CONTROL OF AN INTEGRATED HUMAN THERMAL SYSTEM BY RESPONSE SURFACE METHODOLOGY
C. L. Hwang, L. T. Fan, S. A. Konz, and H. N. Ozarkar Aug. 1974 78 p refs
(Grant NSF GK-41206)
(PB-234660/9; ISDO-59) Avail: NTIS HC $4.75 CSCL 06Q

The optimal policy for controlling an integrated human thermal system (the body and a watercooled garment on the head and torso) was determined by the response surface methodology. This methodology finds empirically and systematically the optimal control policy; this report, however, presents a scheme based on the method for carrying out a prior computer simulation of the experimental search for the optimum control. The objective of the control was to minimize the control effort for operating the external thermal regulation device while maintaining a state of thermal comfort (thermoneutrality). GRA

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering*.

N75-13539* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CONTINUOUS FOURIER TRANSFORM METHOD AND APPARATUS Patent
Robert M. Munoz, inventor (to NASA) Issued 26 Nov. 1974 12 p Filed 18 Apr. 1973 Supersedes N73-21199 (11 - 12, p 1381)
(NASA-Case-ARC-10466-1; US-Patent-3,851,162; US-Patent-Appl-SN-352382; US-Patent-Class-235-156; US-Patent-Class-235-197; US-Patent-Class-324-77B) Avail: US Patent Office CSCL 09B

An input analog signal to be frequency analyzed is separated into N number of simultaneous analog signal components each identical to the original but delayed relative to the original by a successively larger time delay. The separated and delayed analog components are combined together in a suitable number of adders and attenuators in accordance with at least one component product of the continuous Fourier transform and analog signal matrices to separate the analog input signal into at least one of its continuous analog frequency components of bandwidth 1/N times the bandwidth of the original input signal. The original analog input signal can be reconstituted by combining the separate analog frequency components in accordance with the component products of the continuous Fourier transform and analog frequency component matrices. The continuous Fourier transformation is useful for spectrum analysis, filtering, transfer function synthesis, and communications. Official Gazette of the U.S. Patent Office

N75-13540# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Dept. de Protection.
INTERMEDIATE MEMORY COUNTING SCALER. TIME BASE AND INCORPORATED KEY PUNCH COMMAND
R. Rigaudiere Mar. 1974 27 p In FRENCH
(CEA-N-1699) Avail: AEC Depository Libraries HC $4.50

The scaler was developed in order to repeatedly effect count measurements during predetermined time intervals with a minimum interruption of the measurements for the resulting output. When the measurement time terminates, the contents of the scaler are transferred to an intermediate memory; a new cycle can commence immediately, the time base automatically resetting itself. The keypunch command system interrogates the memory during the counting measurements. NSA

N75-13541# Stanford Univ., Calif. Dept. of Computer Science.
GEOMED: GEOMETRIC EDITOR
Bruce G. Baumgart May 1974 48 p
(Contract DAHC15-73-C-0435; ARPA Order 2495)
(AD-780452/9; STAN-CS-74-414; AIM-232) Avail: NTIS HC $3.75 CSCL 09/2

GEOMED is a system for doing 3-D geometric modeling; used from a keyboard, it is an interactive drawing program; used as a package of SAIL or LISP accessible subroutines, it is a graphics language. Arbitrary polyhedra can be constructed, moved about, and viewed in perspective with hidden lines eliminated. Camera and image models are provided so that

simulators relevant to computer vision, problem solving, and animation may be constructed. Author (GRA)

N75-13542# Mitre Corp., Bedford, Mass.
CONCEPT OF OPERATION FOR HANDLING I/O IN A SECURE COMPUTER AT THE AIR FORCE DATA SERVICES CENTER (AFDSC)
E. L. Burke Apr. 1974 40 p refs
(Contract F19628-73-C-0001)
(AD-780529/4; MTR-2733; ESD-TR-74-113) Avail: NTIS HC $3.75 CSCL 09/2

The operation of a computer system in a secure fashion requires the control of access to all parts of the system. One part of the system which is often neglected when access and security controls are developed is the input/output subsystem. This paper develops a general concept of operations for I/O in a secure computer system. This concept is then applied to the proposed two-level, Secret-Top Secret, MULTICS System at the Air Force Data Services Center (AFDSC). The most unusual operational feature recommended for the AFDSC MULTICS is the use of autonomous processes to perform all I/O, preventing any user from directly accessing any I/O device. Author (GRA)

N75-13543# ITT Electron Tube Div., Easton, Pa.
REPETITIVE SERIES INTERRUPTER Triannual Report, 1 Nov. 1973 - 28 Feb. 1974
Charles L. Shackelford May 1974 31 p
(Contract DAAB07-73-C-0320)
(AD-780086/5; ECOM-0320-2-73; Rept-2) Avail: NTIS HC $3.75 CSCL 09/1

The theory of operation, computer aided design techniques, and operating models of the interrupter and the magnetic modulator employing the interrupter are discussed. The operating models are to be able to interrupt 200 amperes at 15 kilovolts. They are to provide control of 0.8 ampere direct current. The design approach is an extension of hydrogen thyratron techniques. Design and construction of four devices was undertaken during the period. A study of 10 interaction space coupling arrangements was completed. Circuit redesign and construction were performed. Interruption of 200 amperes at 15 kilovolts was achieved. Interruption of 33 amperes with subsequent permanent hold-off of 10 kilovolts was performed. Author (GRA)

N75-13544# Stanford Research Inst., Menlo Park, Calif.
ELECTRON-BEAM ADDRESSED MEMORY RESEARCH Final Report, Mar. 1972 - Jan. 1974
John Kelley and John S. Moore Wright-Patterson AFB, Ohio AFAL Aug. 1974 202 p refs
(Contract F33615-72-C-1906; AF Proj. 4150)
(AD-785403; SRI-ISU-1778; AFAL-TR-74-176) Avail: NTIS CSCL 09/2

Work toward the realization of a practical operational Electron-Beam-Addressed Memory (EBAM) is described. Consideration is given to the design of the various components. The electrostatic microcapacitor or mucap medium is described and analyzed. Operation in the quasi-continuous mode is discussed and its importance in the attainment of device stability and target yield is outlined. Measurements on the storage medium are presented. Two pieces of equipment are described: the SRI-sponsored Analog System, designed for making storage target measurments, and an EBAM module, recently delivered to the USAF Avionics Laboratory. Design, construction, and performance of both systems are discussed. Author (GRA)

N75-13545# RAND Corp., Santa Monica, Calif.
SURVEY OF MODELS, SIMULATIONS, AND GAMES Summary Report
Garry D. Brewer Feb. 1974 19 p refs Sponsored by ARPA
(AD-784961; P-5177) Avail: NTIS CSCL 09/2

The paper presents a summary of highlights from a Defense Advanced Research Projects Agency (ARPA)-sponsored gaming evaluation project. The paper discusses a detailed survey instrument used to characterize 132 operational models, simulations, and games (MSGs) in the active Department of Defense inventory as of the end of 1971. Major findings related to the purpose, production, operations, use, and costs of the sample are presented. (Modified author abstract) GRA

N75-13439* Linguistic Systems, Inc., Cambridge, Mass.
AUTOMATED SYSTEM FOR MEASUREMENT, COLLECTION AND PROCESSING OF HYDROMETEOROLOGICAL DATA ABOARD SCIENTIFIC RESEARCH VESSELS OF THE GUGMS (SIGMA-s)
Ye. P. Borisenkov and O. M. Fedorov *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 1-18 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 5-18 (For availability see N75-13438 04-46)
CSCL 05B

N75-13442* Linguistic Systems, Inc., Cambridge, Mass.
A SYSTEM OF AUTOMATED PROCESSING OF DEEP WATER HYDROLOGICAL INFORMATION
V. A. Romantsov, I. A. Dyubkin, and L. N. Klyukbin *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 49-70 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 43-58 (For availability see N75-13438 04-46)
CSCL 05B

N75-13445* Linguistic Systems, Inc., Cambridge, Mass.
SMALL PARAMETRIC MODEL OF THE PRECOMPUTATION OF METEOROLOGICAL FIELDS ON THE BASIS OF COMPLETE EQUATIONS AND ITS ENERGETIC ANALOGS
Ye. P. Borisenkov *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 85-111 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 68-88 (For availability see N75-13438 04-46)
CSCL 09B

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N75-13546*# Martin Marietta Corp., Baltimore, Md.
THERMAL RADIATION ANALYSIS SYSTEM (TRASYS) USER'S MANUAL, APPENDIX H, VOLUME 2
May 1973 277 p
(Contract NAS9-13033)
(NASA-CR-140375; MCR-73-105-Vol-2-App-H) Avail: NTIS HC $8.75 CSCL 09B
For abstract, see N74-32371.

N75-13547*# Ohio Univ., Athens. Avionics Engineering Center.
COMPUTER PROGRAM CORDET
R. A. Palkovic Nov. 1974 23 p refs
(Grant NGR-36-009-017)
(NASA-CR-14113; TM-14) Avail: NTIS HC $3.25 CSCL 09B

A FORTRAN 4 computer program provides convenient simulation of an all-digital phase-lock loop (DPLL). The DPLL forms the heart of the Omega navigation receiver prototype. Through the DPLL, the phase of the 10.2 KHz Omega signal is estimated when the true signal phase is contaminated with noise. This investigation has provided a convenient means of evaluating loop performance in a variety of noise environments, and has proved to be a useful tool for evaluating design changes. The goals of the simulation are to: (1) analyze the circuit on a bit-by-bit level in order to evaluate the overall design; (2) see easily the effects of proposed design changes prior to actual breadboarding; and (3) determine the optimum integration time for the DPLL in an environment typical of general aviation conditions. Author

N75-13548# Montana State Univ., Bozeman. Electronics Research Lab.
FAULT DIAGNOSIS BY INSERTING THE MINIMUM NUMBER OF TEST POINTS IN SYSTEM GRAPHS
Mahesh Patel 15 Jul. 1974 209 p refs
(Contract N00014-67-C-0477)
(AD-785272; ERL-1574) Avail: NTIS CSCL 09/2

Classical methods of fault-diagnosis in combinational and sequential logic are effective for small circuits, but are too exhaustive and do not provide any systematic way for analyzing entire computer systems. Large scale integration and increased complexity of present-day computer systems have created a need for new graph theory approaches for understanding, analyzing and visualizing malfunctions in these systems. The object of this report has been the development of an algorithm for inserting test points in system structure to obtain maximum improvement. The algorithm is initiated using only basic information (edge connections) and generates the locations of test points. Test points obtained are the minimum for a given system graph. The algorithm is computationally efficient. The report also includes theorems on lower bounds on the number of test points required for a system graph. (Modified author abstract)
GRA

N75-13549# Mitre Corp., Bedford, Mass.
REMOTE-TERMINAL EMULATOR (DESIGN VERIFICATION MODEL): SUPPORT SOFTWARE AND HARDWARE DIAGNOSTICS, VOLUME 9
M. C. Sarajian Jul. 1974 47 p refs
(Contract F19628-73-C-0001; AF Proj. 572Q)
(AD-784855; MTR-2677-Vol-9; ESD-TR-74-183-Vol-9) Avail: NTIS CSCL 09/2

The Remote-Terminal Emulator is a minicomputer-based system which generates message loads for use in testing and evaluating large-scale multiterminal computer systems. This series of reports will describe the fixed-site and on-site Design Verification Models that were developed on Data General NOVA 800 minicomputers. This report describes MITRE-designed support programs and hardware diagnostics used in the development of the Design Verification Model. Also identified are the vendor-supplied support programs and diagnostics.
Author (GRA)

N75-13550# Naval Research Lab., Washington, D.C.
A SECOND ORDER RUNGE-KUTTA INTEGRATION SUB-ROUTINE THAT USES A DIFFERENT STEP-SIZE FOR EACH VARIABLE Final Report
Harold L. Toothman May 1974 26 p
(AD-779839/0; NRL-MR-2795; NRL-Computer-Bull-37) Avail: NTIS HC $3.75 CSCL 09/2

The program was written to handle the numerical intergration of initial value problems in which the frequency content of the variables differ considerably among themselves. In order to save computer time each variable is integrated with its own step-size so that the derivatives of the slowly changing variables are calculated less frequently than the derivatives of the rapidly changing variables. A second order Runge-Kutta method is used since high accuracy is not required. Author (GRA)

N75-13123 Joint Publications Research Service, Arlington, Va.
SINGLE COMPUTER LANGUAGE IN CEMA COUNTRIES
L. Lazarenko *In its* Automation, Telemech. and Commun. (JPRS-63429) 12 Nov. 1974 p 21-25 Transl. into ENGLISH from Avtomat. Telemekh. Svyaz (Moscow), no. 8, 1973 p 40-42 (For availability see N75-13121 04-32)

N75-13440* Linguistic Systems, Inc., Cambridge, Mass.
SOFTWARE FOR THE SIGMA-s
I. A. Dyubkin *In its* Automation of the collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 19-33 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 19-30 (For availability see N75-13438 04-46)
CSCL 09B

62 COMPUTER SYSTEMS

Includes computer networks.

N75-13441* Linguistic Systems, Inc., Cambridge, Mass.
THE PROBLEM OF ORGANIZATION OF A COASTAL COORDINATING COMPUTER CENTER
I. A. Dyubkin and I. I. Lodkin *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 34-48 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 32-42 (For availability see N75-13438 04-46)
CSCL 09B

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

N75-13551 Texas Univ., Austin.
THE DESIGN OF AUTOMATIC CONTROL SYSTEMS USING INTERACTIVE COMPUTER GRAPHICS Ph.D. Thesis
Kenneth Royce Young 1974 188 p
Avail: Univ. Microfilms Order No. 74-24957

The design engineer has used the digital computer to help him solve engineering problems for more than two decades. During this time the digital computer was not able to accept or return information in a form that was most convenient for the designer. The designer, therefore, generally spent more time converting his problem into a form the computer could understand, than it took the computer to solve it. With the development and introduction of the graphic input-output device in conjunction with the light pen and keyboard, the digital computer can now communicate with the designer in his own terms. While the communication hardware is available, the designer cannot use it unless the communications software is developed. The software must manage the communication between the designer and the digital computer with the graphic input-output device as the interface. Dissert. Abstr.

N75-13552*# Scientific Translation Service, Santa Barbara, Calif.
ON A METHOD OF MINIMIZING THE MAXIMAL ACCUMULATED ERROR
G. M. Rozenblat Washington NASA Dec. 1974 15 p refs Transl. into ENGLISH from Vestn. Mosk. Univ., Mat. Mekh. (Moscow), no. 3, May-Jun. 1974 p 74-81
(Contract NASw-2483)
(NASA-TT-F-16061) Avail: NTIS HC $3.25 CSCL 12B

The problem of synthesizing control systems on the principle of minimizing the maximal accumulated error is considered. An algorithm is proposed for minimizing the maximal accumulated error. A second-order vibratory system is considered for which the proposed algorithm was realized on an electronic computer.
Author

N75-13553*# Scientific Translation Service, Santa Barbara, Calif.
SPACE CYBERNETICS
Washington NASA Dec. 1974 6 p Transl. into ENGLISH from Sovetskaya Rossiya (USSR), 27 Aug. 1974 p 4 and Sotsialisticheskiya Industriya (USSR), 28 Aug. 1974 p 3
(Contract NASw-2483)
(NASA-TT-F-16087) Avail: NTIS HC $3.25 CSCL 06D

The Sixth International Symposium of the International Federation on Automatic Control (IFAK) in Tsakhkadzor is discussed. More than 300 scientists from 16 countries discussed for six days the pressing problems of space cybernetics and related trends in science and technology, and indicated the areas of and prospects for international cooperation in this direction.
Author

N75-13554# Joint Publications Research Service, Arlington, Va.

TRANSLATIONS ON CYBERNETICS USSR AND EASTERN EUROPE, NO. 1
25 Nov. 1974 130 p Transl. into ENGLISH from Russian and Eastern Europe reports
(JPRS-63527) Avail: NTIS HC $5.75

The theoretical, technical, and applied aspects of cybernetics are reported as defined in the U.S.S.R. and Eastern Europe. The information is taken from the world press, primarily the scientific periodicals, books, and newspapers of the Soviet Union and East European countries. Items include abstracts, excerpts, and full or summary translations. Author

N75-13555# Lockheed Missiles and Space Co., Palo Alto, Calif.
CONSTRUCTION OF RECOGNITION SYSTEMS
A. L. Gorelik and V. A. Skripkin [1974] 15 p ref Transl. into ENGLISH from the book "Construction of Recognition Systems" Moscow, Sovetskoe Radio, 1974 223 p
Avail: NTIS HC $3.25; National Translations Center, John Crerar Library, Chicago, Ill. 60616

Problems in designing and developing recognition systems are discussed with emphasis on the application of logic to the construction of algorithms. F.O.S.

N75-13556# Commissariat a l'Energie Atomique, Saclay (France).
ANALYSIS AND SYNTHESIS OF A LOGIC CONTROL CIRCUIT BY BINARY ANALYSIS METHODS
A. Chicheportiche Jun. 1974 95 p refs In FRENCH
(CEA-R-4588) Avail: AEC Depository Libraries HC $7.75

The structure and function of logic control circuits were studied by binary analysis methods. Special attention was given to circuit defects and their detection by sequential graph methods. Several optimization procedures for the circuits and numerical techniques used in the study are given. Transl. by E.H.W.

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N75-13557+ Engineering Sciences Data Unit, London (England).
THE STABILITY AND RESPONSE OF LINEAR SYSTEMS. PART 1: INTRODUCTORY CONCEPTS OF STABILITY
Aug. 1974 17 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-74019-Pt-1) Copyright. Avail: NTIS HC $74.50

Methods are considered for determining both the stability of linear systems and also how the system should be modified to achieve a stable state. Introduced are mathematical description of linear systems and the formulation of the characteristic equation. The calculation of the modes of motion is explained and the assessment of stability from a knowledge of the roots of the characteristic equation, or from its coefficients by means of the Routh-Hurwitz Criteria, are discussed. The concept of a system transfer function is introduced together with its application to systems with feedback. Also considered are methods of graphical presentation that display the effects on the characteristics of the system by varying some of its parameters. A stability analysis based on frequency response, including the Nyquist, Bode and Nichols presentations, is elaborated. Author

N75-13558 University of Southern Calif., Los Angeles.
THE NONLOCAL EXISTENCE AND SMOOTHNESS OF INVARIANT MANIFOLDS FOR FLOWS Ph.D. Thesis
Albert Aiken Newton 1974 164 p
Avail: Univ. Microfilms Order No. 74-26039

A flow pi = (x, t) on Euclidean Rn, defined by a vector field X epsilon (sq C)(Rn), is given. A sub manifold E of Rn of the form ((Y,f(y)): y epsilon Rm), where f:Rm approaches Rn-m is of the class sq C and $1 < m < n-1$, is considered. Each set E x t = (pi(y,f(y),t):y epsilon Rm) is clearly a sq C sub manifold of Rn. A differential system can be formulated with the property that if x epsilon E x t then H(f,x,t) is the orthogonal projection of the field vector X(x) on the space of vectors normal to E x t at x. Dissert. Abstr.

N75-13559 Denver Univ., Colo.
EIGENVALUE BEHAVIOR FOR SYMMETRIC ELLIPTIC SYSTEMS UNDER BOUNDARY DEFORMATIONS Ph.D. Thesis
Mark John Balas 1974 81 p
Avail: Univ. Microfilms Order No. 74-24652

The spectral perturbation theory is developed for symmetric elliptic systems on the interior of a compact region in Rn under analytic boundary deformations. Coercive boundary conditions on the unperturbed system cause it to have compact resolvent and hence discrete spectrum. Analytic boundary conditions are shown to exist for small deformations and, on the unperturbed region, a skew self-adjoint family of operators indexed by the boundary deformation parameter is produced with compact analytic resolvent. The analytic perturbation theory of Kato is extended to handle these non Type A families and a formula is derived from the power series representations for the variation of a simple eigenvalue of the perturbed system. This formula depends only on the boundary values of a solution of the unperturbed problem, the boundary variation, and the normal matrix of the system. Dissert. Abstr.

N75-13560 Toronto Univ. (Ontario). Dept. of Computer Science.
TEST RESULTS ON INITIAL VALUE METHODS FOR NON-STIFF ORDINARY DIFFERENTIAL EQUATIONS
W. H. Enright, R. Bedet, I. Farkas, and T. E. Hull May 1974 253 p refs Sponsored by Natl. Res. Council of Can.
(TR-68) Copyright. Avail: Issuing Activity

Numerical methods were assessed on the basis of how well they solve a collection of routine nonstiff differential equations under a variety of accuracy requirements. The methods tested include extrapolation methods, variable-order Adams methods, Runge-Kutta methods based on the formulas of Fehlberg, and appropriate methods from the SSP and IMSL subroutine libraries. The results indicate that: (1) A numerical method must have the ability to vary its order. (2) When derivative evaluations are relatively expensive (where efficiency depends primarily on the number of function evaluations required to solved the problems), the variable-order Adams methods of Sedgwick and Krogh are the best. When derivative evaluations are relatively inexpensive (where efficiency depends primarily on the overhead of the method), the Runge-Kutta-Fehlberg methods are best (although the higher order ones cannot be used for quadrature). Author

N75-13561 Toronto Univ. (Ontario). Dept. of Computer Science.
OPTIMAL STEPSIZE SEQUENCES AND REQUIREMENTS FOR THE LOCAL ERROR FOR METHODS FOR (STIFF) DIFFERENTIAL EQUATIONS
Bengt Lindberg May 1974 77 p refs Revised
(TR-67-Rev) Copyright. Avail: Issuing Activity

Characteristics of optimal stepsize sequences for different classes of problems are presented. The stepsize sequence for systems of stiff differential equations was obtained with a criterion on the local error/step and required less work than the stepsize sequence obtained with a criterion on the local error/unit step. The amount of work corresponded to the criteria and differed by several orders of magnitude, depending on the order of the method and the stiffness ratio of the problem. An estimate of the global error for a class of methods for solution of systems of stiff differential equations is described. Author

N75-13562 Toronto Univ. (Ontario). Dept. of Computer Science.
COMPARING NUMERICAL METHODS FOR STIFF SYSTEMS OF ODES
W. H. Enright, T. E. Hull, and B. Lindberg Sep. 1974 70 p refs
(TR-69) Copyright. Avail: Issuing Activity

A technique is described for comparing numerical methods which were designed to solve stiff systems of ordinary differential equations. The basis of a fair comparison is discussed in detail. Measurements of cost and reliability were made over a collection of 25 carefully selected problem which were designed to show how certain major factors affect the performance of a method. The technique was applied to five methods, including one based on backward differentiation formulas, another on second derivative formulas, and a third on extrapolation. Each of these three has

a weakness which can be identified with particular problem characteristics. Author

N75-13563*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ERROR ANALYSIS OF HOUSEHOLDER TRANSFORMATIONS AS APPLIED TO THE STANDARD AND GENERALIZED EIGENVALUE PROBLEMS
Robert C. Ward Washington Dec. 1974 25 p refs
(NASA-TN-D-7764; L-9765) Avail: NTIS HC $3.25 CSCL 12A

Backward error analyses of the application of Householder transformations to both the standard and the generalized eigenvalue problems are presented. The analysis for the standard eigenvalue problem determines the error from the application of an exact similarity transformation, and the analysis for the generalized eigenvalue problem determines the error from the application of an exact equivalence transformation. Bounds for the norms of the resulting perturbation matrices are presented and compared with existing bounds when known. Author

N75-13564# RAND Corp., Santa Monica, Calif.
NUMERICAL MODELING EXPERIMENTS
W. L. Gates Sep. 1974 18 p refs
(P-5268) Avail: NTIS HC $3.25

The polar regions of the earth are generally regions of net radiative energy deflict and maintain their climatic equilibrium by the receipt of energy transported from lower latitudes. They are therefore an important part of the overall pattern of thermal forcing of the atmosphere and ocean, and variations in their thermal equilibrium may be expected to affect the character of the global circulation. Numerical experiments were performed which were intended to culminate in the design of improved global numerical models in which the role of the polar regions may be made clear. It is believed that numerical models offer the best possibility for such a quest, since they consider a broad range of interacting dynamical effects and permit flexibility in parameterization. Author

N75-13565# RAND Corp., Santa Monica, Calif.
MULTIVARIATE EMPIRICAL BAYES AND ESTIMATION OF COVARIANCE MATRICES
Bradley Efron and Carl Morris Sep. 1974 23 p refs
(P-5278) Avail: NTIS HC $3.25

The problem of estimating a covariance matrix is considered in the standard multivariate normal situation. The loss function is one obtained naturally from the problem of estimating several normal mean vectors in an empirical Bayes situation. Estimators which dominate any constant multiple of the sample covariance matrix are presented. These estimators work by shrinking the sample eigenvalues toward a central value, in much the same way as the James-Stein estimator for a mean vector shrinks the maximum likelihood estimators toward a common value. Author

N75-13566# Toronto Univ. (Ontario). Dept. of Computer Science.
A STRUCTURE FOR PROGRAMS THAT SOLVE ORDINARY DIFFERENTIAL EQUATIONS
T. E. Hull and W. H. Enright May 1974 41 p Sponsored by Natl. Res. Council of Can.
(TR-66) Avail: NTIS HC $3.25

A structure for programs that solve initial value problems associated with ordinary differential equations is described. A particular parameter list is proposed, and an overall structure for the program itself is described in terms of four stages of the numerical process. The ideas are applicable to a wide variety of methods, and contribute to some standardization. An example based on formulas due to Fehlberg is presented in an appendix, along with a detailed discussion of the design decisions for this particular method. The resulting program is reasonably reliable and efficient. Author

N75-13567# Syracuse Univ., N.Y. Dept. of Electrical and Computer Engineering.
CHARACTERISTICS AND CAPABILITIES OF WALSH FUNCTIONS Final Scientific Report, 1 Jun. 1972 - 30 Jun. 1974
David K. Cheng 15 Aug. 1974 35 p refs
(Grant AF-AFOSR-2355-72; AF Proj. 9768)
(AD-785430; AFOSR-74-1439TR) CSCL 09/4

This is a final scientific report on the characteristics and capabilities of Walsh functions. Research achievements in the areas of (a) Walsh transform of sampled time functions and sampling principle, (b) Walsh-function analysis of discrete dyadic-invariant systems, (c) time-domain analysis of discrete dyadic-invariant systems, (d) time-shift theorems for Walsh transforms and solution of difference equations, and (e) linear arrays excited by Walsh-shaped currents are summarized. Reprints are attached. GRA

N75-13568# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CONVERGENCE RATE ESTIMATES FOR POLYA-JACKSON PROCESS FOR CONTINUOUS POLYNOMIALS UNDER ADDITIONAL STRUCTURAL CONDITIONS
E. Ya. Remez 24 May 1974 11 p ref Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (USSR), v. 58, no. 8, 1947 p 1601-1604
(AD-780343/0; FTD-HT-23-1172-74) Avail: NTIS HC $3.25 CSCL 12/1

A system of any n+1 real functions v sub 1 (x) (i=0, I, ..., n)- is examined that is presumed continuous on segment (a, b) of length b-a=I and linearly independent on it. Polynomials of the least mean exponential and even deviation from 0 on (a, b) are designated. In order to obtain any convergence rate estimates, specific structural conditions for functions v sub I (x) are introduced. Author

N75-13569# Southern Methodist Univ., Dallas, Tex. Dept. of Statistics.
DESCRIPTION OF LATANAL, A COMPUTER PROGRAM FOR LATENT ROOT REGRESSION ANALYSIS
Richard F. Gunst, John T. Webster, and Robert L. Mason 10 May 1974 25 p refs
(Contract N00014-72-A-0296; NR Proj. 042-280)
(AD-785289; TR-116) Avail: NTIS CSCL 12/1

The purpose of this paper is to present a computer program which will perform the calculations needed for latent root regression analysis. Latent root regression is a technique proposed by the authors to supplement ordinary least squares when multicollinearity exists in the matrix of regression variables. Included in the paper is a discussion of input and output for the program, references for a discussion of the technique, a program listing, and sample output. Author (GRA)

N75-13570# North Carolina Univ., Chapel Hill. Dept. of Statistics.
ASPECTS OF EXTREME VALUE THEORY FOR STATIONARY PROCESSES: A SURVEY
M. R. Leadbetter Sep. 1974 31 p refs
(Contract N00014-67-A-0321-0002; NR Proj. 042-214)
(AD-785278; Mimeo-Ser-951) Avail: NTIS CSCL 12/1

The primary concern in this paper is with the distributional results of classical extreme value theory, and their development to apply to stationary processes. The main emphasis is on stationary sequences, where the theory is well developed. Results available for continuous parameter processes are also described, but with particular reference to stationary normal processes. GRA

N75-13571# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
PRINCIPLES FOR TESTING POLYNOMIAL ZEROFINDING PROGRAMS
M. A. Jenkins (Queen's Univ., Kingston, Ont.) and J. F. Traub Mar. 1974 29 p refs
(Contract N00014-67-A-0314-0010; Grant NSF GJ-321; NR Proj. 044-422)
(AD-784426) CSCL 12/1

The state-of-the-art in polynomial zerofinding algorithms and programs is briefly summarized. Our focus in this paper is on principles for testing such programs. We view testing as requiring four steps: (1) testing program robustness, (2) testing for convergence difficulties, (3) testing for specific weakness of the algorithms, (4) assessment of program performance by statistical

testing. The author's algorithm for real polynomials has been reprogrammed with substantial modifications to the decision making processes. In order to verify that the new program is a reliable and efficient mathematical software product, it underwent the testing outlined above. The results of part of this testing are described in this paper. (Modified author abstract) GRA

N75-13572# California Univ., Berkeley. Operations Research Center.
EFFICIENT ESTIMATORS FOR SIMULATED QUEUEING SYSTEMS
Averill M. Law Mar. 1974 98 p refs
(Contract EPA-R-801870; Grant NSF GP-30961)
(PB-234142/8; ORC-74-7) Avail: NTIS HC $4.75 CSCL 12B

The thesis is primarily concerned with the efficient estimation of mean delay, d, and time average number in queue, Q. For a certain class of queueing systems, it is analytically shown to be more efficient to estimate Q by multiplying an estimate of d by the arrival rate of customers, than to estimate Q directly. This relationship is empirically verified for a much larger class of queueing systems. For single server queueing systems, an estimator is introduced which is more efficient than the normal estimator of d. The efficient estimation of mean waiting time, w, and time average amount of work in system, E(V), is also considered. It is seen to be more efficient to estimate w and E(V) from an estimate of d, than to estimate them directly.
GRA

N75-13573# Southern Methodist Univ., Dallas, Tex. Dept. of Statistics.
SOME PROPERTIES OF A TEST FOR CONCORDANCE OF TWO GROUPS OF RANKINGS
Loretta Li and William R. Schucany Aug. 1974 24 p refs
(Contract N00014-72-A-0296; NR Proj. 042-280)
(AD-784390; TR-122) Avail: NTIS CSCL 12/1

The statistic L, introduced to test for concordance within and between two groups of rankings of k objects is shown to be related to several measures of internal rank correlation. It has been previously shown that Kendalls W is proportional to the average of the rank correlations of all pairs of rankings in a single group and the Page's L is essentially the average of the rank correlations of an external ranking with each ranking in a group suggested by Lyerly. Similarly L is here shown to be directly related to the average of all rank correlations between a ranking from one group with a ranking from the other group. (Modified author abstract) GRA

N75-13574# Aerospace Research Labs., Wright-Patterson AFB, Ohio.
ON THE EXACT DISTRIBUTION OF THE TRACE OF A COMPLEX MULTIVARIATE BETA MATRIX Interim Report
P. R. Krishnaiah and F. J. Schuurmann Jul. 1974 35 p refs
(Contract F33615-71-C-1463; AF Proj. 7071)
(AD-785944; ARL-TR-74-107) Avail: NTIS CSCL 12/1

An expression was given by Krishnaiah for the density of the distribution of the trace of a complex multivariate beta matrix. Using this expression, the authors have computed exact upper 1%, 2.5%, 5%, 10%, 25%, and 50% points of the distribution of the above trace. The applications of this distribution in the area of the inference on multiple time series are also discussed. Finally, the usefulness of these tables is illustrated by analyzing some data on a C-5A aircraft. Author (GRA)

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N75-13575 Illinois Inst. of Tech., Chicago.
AN INFORMATION THEORETIC APPROACH TO ESTIMATION IN DISCRETE TIME SYSTEMS Ph.D. Thesis
Paul Roy Kalata 1974 137 p
Avail: Univ. Microfilms Order No. 74-23983

An error entropy estimation criterion was developed by involving the error probability density function in the estimator cost functional. Several estimation principles were derived independently of the estimation procedure, structure of the system, observation procedure, and the statistical nature of the noise disturbances. The estimation principles establish the existence of a lower bound to the error entropy performance index, which is the equivocation of the system that is achieved when the estimation error is made statistically independent of the observations. The optimal error entropy predictor, filter, and smoother are derived for linear systems and observation procedures involving Gaussian noise disturbances and are identical to the optimal error variance solutions. Dissert. Abstr.

N75-13576*# Houston Univ., Tex. Dept. of Mathematics.
SOME QUALITATIVE REMARKS ON THE VARIATION OF THE PROBABILITY OF ERROR
Homer F. Walker Aug. 1974 18 p refs
(Contract NAS9-12777)
(NASA-CR-140385; Rept-34) Avail: NTIS HC $3.25 CSCL 12A

The qualitative behavior of the probability of misclassifying observations from two normally distributed populations as the classification regions are varied in a prescribed way is described in order to provide a preliminary generalization of the results obtained by Walton for the case of normally distributed observations with varying a priori probabilities. Author

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N75-13577 Yale Univ., New Haven, Conn.
STABLE ADAPTIVE SCHEMES FOR STATE ESTIMATION, IDENTIFICATION AND CONTROL Ph.D. Thesis
Gerd Lueders 1974 115 p
Avail: Univ. Microfilms Order No. 74-25753

An adaptive observer was developed which simultaneously observes the state and identifies the parameters of any multi-variable linear system. This adaptive scheme is structured as a parameter adaptive model reference system (PAMRS) and uses only input-output data from the unknown system. Its convergence is always guaranteed. An adaptive observer for discrete linear systems was developed. This observer was then modified to result in a significantly more efficient identification scheme for continuous linear systems when using a digital computer. Various examples illustrate the performance of these adaptive observers. The theory of stable PAMRS is unified by deriving a very general set of quadratic vector differential equations which are asymptotically stable in the whole. Many PAMRS are particular cases of these general equations. Some partial results on nonmatching in adaptive control are included, along with optimum choice of the adaptive gains and measurement noise.
Dissert. Abstr.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N75-13578 Texas Technological Univ., Lubbock.
APPLICATIONS OF GROUP THEORY TO PATTERN RECOGNITION Ph.D. Thesis
Hudai Dirilten 1974 86 p
Avail: Univ. Microfilms Order No. 74-23043

In pattern recognition it is very desirable to extract features which are not sensitive to irrelevant alterations such as translations, rotations, magnifications, shears, reflections etc. Many of these alterations can be characterized by an affine group of transformations. In this work the objective is to remove the effects of such alterations or to provide features which are invariant under these alterations for pattern recognition in a finite dimensional real linear space E. Using a minicomputer together with an optical scanner applications to character recognition and remote sensing are demonstrated. The hardware and software

implementations of the techniques presented are very fast and simple. Dissert. Abstr.

N75-13579 Nauka Press, Novosibirsk (USSR).
CERTAIN PROBLEMS OF THE THEORY OF THE MONTE-CARLO METHODS
G. A. Mikhaylov 1974 145 p refs In RUSSIAN
Copyright. Avail: Issuing Activity

The theory and applications of the Monte Carlo method were studied for solving multidimensional problems of computer mathematics and mathematical physics. A series of effective algorithms were examined for (1) modeling random values, (2) solving 2nd order integral equations, and (3) solving problems of radiation transfer theory. Complex problems of atmospheric optics and their applied value are discussed. Transl. by M.J.S.

N75-13580# Akademiya Nauk URSR, Kiev. Inst. Teoreticheskoj Fiziki.
GENERALIZED MOMENT PROBLEM
V. A. Yatsun 1974 18 p refs
(ITF-74-34E) Avail: AEC Depository Libraries HC $4.00

The generalized moment problem is considered which arises under analyzing the Gribov-Froissart formula for the partial amplitudes. The necessary and sufficient conditions of solvability of the problem by reducing it to the power problem are obtained. Author (NSA)

N75-13581# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
MASSIVE VECTOR FIELD AND THE HORIZON SURFACE
G. V. Isaev 1974 8 p refs In RUSSIAN
(JINR-P2-7972) Avail: AEC Depository Libraries HC $4.00

The central symmetrical static black hole and its inability to possess external massive vector field are discussed. The four propositions supporting this assumption agree with Einstein's equation for massive vector field only when the potential equals zero on the horizon. Considering statics, and assuming the absence of essential peculiarities everywhere except where $r = 0$, it was found that the external field does exist and the horizon surface is absent at any finite r. The process of gravity compression of the central symmetrical body having the zero massive vector field is also discussed. Transl. by M.J.S.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N75-13582 Texas Univ., Austin.
PROPAGATION OF MILLIMETER WAVES THROUGH CLOUDS Ph.D. Thesis
Lai-iun Lo 1974 130 p
Avail: Univ. Microfilms Order No. 74-24895

The theory of scattering and attenuation by clouds is reviewed and theoretical results are presented. The dependence of absorption and emission in the millimeter wave spectrum on the cloud temperature is studied for different types of clouds. Dissert. Abstr.

N75-13583 Nauka Press, Moscow (USSR).
BAND TRANSMISSION LINES
Ye. I. Nefedov and A. T. Failkovskiy 1974 128 p refs In RUSSIAN
Copyright. Avail: Issuing Activity

Symmetrical and unsymmetrical band transmission lines and the basic forms of discontinuities encountered in them were investigated. Uses of band, slotted, and coplanar lines, their peculiarities, and their characteristics are discussed along with methods of mathematical physics which can be applied to the calculation of band systems. The calculation was performed of matrix elements of typical discontinuity dispersion in symmetrical band lines, and the algorithms for calculating discontinuities in unsymmetrical lines were constructed. Concrete expressions and graphs are presented for modules and phases of image and passage coefficients. Transl. by M.J.S.

N75-13584# New South Wales Univ., Sydney (Australia).
APPROACH TO PHYSICAL SCIENCES, 1974
A. Schwartz, ed. 1974 275 p refs Presented at 13th Summer School for Senior Sci. Teachers, Sydney, 14-18 Jan. 1974
Avail: NTIS HC $8.50

Methods of teaching physics and chemistry, which revolve around the inclusion of high school courses within the overall science curriculum and whose emphasis is on the latest developments in scientific research and technology, were the subject of the thirteenth annual Summer School for Senior Science Teachers. Paper themes are concerned with teaching approach and course content for the various physical and chemical sciences. A.A.D.

N75-13585*# Kanner (Leo) Associates, Redwood City, Calif.
COMPARATIVE ANALYSIS OF VARIOUS METHODS OF ESTIMATING THE PARAMETERS IN THE PROBLEM OF V. G. KURT
L. S. Gurin, N. P. Ivanova, V. S. Mokrov, and K. A. Tsoy Washington NASA Jan. 1975 34 p refs Transl. into ENGLISH from Acad. of Sci. USSR (USSR), Report PR-186, 1974 p 1-35
(Contract NASw-2481)
(NASA-TT-F-16115; PR-186) Avail: NTIS HC $3.75 CSCL 20H

Various methods are discussed for estimating the parameters of particle fluxes representing a Poisson process. The particles arrive, through several filters, at a common counter which transmits the arrival time of each eighth particle. The mixing of the particles reduces the accuracy with which the parameters are determined. The efficiency of the estimation methods considered is compared by means of a theoretical analysis and Monte Carlo simulation models using electronic digital computers. The results of the study are applied to the solution of concrete problems. Author

N75-13586*# National Aeronautics and Space Administration, Washington, D.C.
TESTING METHODS AND TECHNIQUES: A COMPILATION Technology Utilization
[1974] 29 p
(NASA-SP-5931(02)) Avail: NTIS HC $1.00 CSCL 14B

Mechanical testing techniques, electrical and electronics testing techniques, thermal testing techniques, and optical testing techniques are the subject of the compilation which provides technical information and illustrations of advanced testing devices. Patent information is included where applicable. A.A.D.

N75-13587# Brookhaven National Lab., Upton, N.Y.
SOME REMARKS ON COLD BORE VACUUM SYSTEMS
H. J. Halama and J. W. Bittner 31 May 1974 11 p refs Sponsored by AEC
(BNL-19033) Avail: NTIS HC $3.25

In storage rings employing superconducting magnets, the use of their cold bores as cryopumps looks at first very attractive. A possible design of a cold vacuum system is therefore discussed in some detail with its theoretical and practical limitations. The comparison with ISABELLE vacuum system reveals that in a large practical machine the warm approach is superior. Relative disadvantages of the cold and warm systems are summarized. Author (NSA)

N75-13588# Brookhaven National Lab., Upton, N.Y.
RANDOM ERROR MULTIPOLES IN SUPERCONDUCTING COSINE AND WINDOW FRAME DIPOLES
G. Parzen 28 Jun. 1974 4 p Sponsored by AEC
(BNL-19042) Avail: NTIS HC $3.25

The random error multipoles in the median plane magnetic field, as measured in the two superconducting 8 cm cosine magnets, ISA I and ISA II, and in the two 8 bend superconducting window-frame magnets, are compared with each other and with the results of theoretical calculations. Author (NSA)

N75-13589# Army Electronics Command, Fort Monmouth, N.J.
VISIBLE AND NEAR-INFRARED ABSORPTION COEFFICIENTS OF MONTMORILLONITE AND RELATED CLAYS
James B. Gillespie, James D. Lindberg, and Michael S. Smith May 1974 16 p refs

(AD-780083/2; ECOM-5539) Avail: NTIS HC $3.25 CSCL 08/7

Estimates of the optical absorption coefficients for montmorillonite, hectorite, nontronite, metabentonite, illite, and attapulgite clay minerals were made by the application of diffuse reflectance spectroscopy in the spectral region from 0.4 to 2.4 micrometers. These clay minerals are weak absorbers over this spectral range, with the primary absorption occurring in the 1.4 micrometers and 1.9 micrometer water bands. The absorption coefficient increased rapidly as the near-ultraviolet region was approached. (Modified author abstract) GRA

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N75-13590 Texas Univ., Austin.

A THEORETICAL AND EXPERIMENTAL INVESTIGATION OF THE PARAMETRIC ACOUSTIC RECEIVING ARRAY Ph.D. Thesis

James Joseph Truchard 1974 150 p

Avail: Univ. Microfilms Order No. 74-29444

The parametric reception of a low frequency plane wave by the use of nonlinear interactions between acoustic waves is examined both theoretically and experimentally The parametric reception of a low frequency wave is accomplished by the use of a high frequency acoustic pump wave which interacts with the low frequency signal wave to produce sound waves at the sum and difference frequencies. These sound waves are received by a second transducer placed on the axis of the pump transducer. This type of parametric array allows for the possibility of narrowbeam detection of a low frequency acoustic signal wave. The interaction of two plane waves is examined theoretically in a manner similar to that considered by Westervelt. Of particular interest is the case in which the pump wave is assumed to be a plane wave originating at and propagating perpendicular to some planar boundary. Dissert. Abstr.

N75-13591# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).

THE NOISE HAZARD ASSOCIATED WITH AIRCRAFT GROUND-SERVICE EQUIPMENT

S. E. Forshaw Jun. 1974 30 p refs

(DCIEM-74-R-1030) Avail: NTIS HC $3.75

The Canadian Forces employ a variety of high-speed gas turbines as air-start and auxiliary power units for aircraft. Flight-line personnel who operate or work in the vicinity of this equipment appear to have varying degrees of exposure to the noise generated by these units. Results of an investigation of possible noise-hazards to hearing associated with the above operations are reported and where appropriate, recommends certain hearing conservation measures. Author

N75-13592*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

SONIC-BOOM MEASUREMENTS IN THE FOCUS REGION DURING THE ASCENT OF APOLLO 17

Herbert R. Henderson and David A. Hilton Washington Dec. 1974 35 p refs

(NASA-TN-D-7806; L-9649) Avail: NTIS HC $3.75 CSCL 20A

Sonic-boom pressure signatures recorded during the ascent phase of Apollo 17 are presented. The measurements were obtained onboard six U.S. Navy ships positioned along the ground track of the spacecraft vehicle in the area of expected focus resulting from the flight path and acceleration of the vehicle. Tracings of the measured signatures are presented along with values of the maximum positive overpressure, positive impulse, signature duration, and bowshock rise time. Also included are brief descriptions of the ships and their location, the deployment of the sonic-boom instrumentation, flight profiles and operating conditions for the launch vehicle and spacecraft, surface-weather and sea-state information at the measuring sites, and high-altitude weather information for the general measurement areas. Comparisons of the measured and predicted sonic-boom overpressures for the Apollo 17 mission are presented. The measured data are also compared with data from the Apollo 15 and 16 missions and data from flight test programs of various aircraft. Author

N75-13593*# National Aeronautics and Space Administration. Pasadena Office, Calif.

REAL TIME ANALYSIS OF VOICED SOUNDS Patent Application

Jung P. Hong, inventor (to NASA) (JPL) Filed 11 Dec. 1974 20 p

(Contract NAS7-100)

(NASA-Case-NPO-13465-1; US-Patent-Appl-SN-531575) Avail: NTIS HC $3.25 CSCL 20A

A power spectrum analysis of the harmonic content of a voiced sound signal is conducted in real time by phase-lock-loop tracking of the fundamental frequency of the signal and successive harmonics hl through hn of the fundamental frequency. The quadrature power and phase of each frequency tracked is measured, differentiating the power measurements of the harmonics in adjacent pairs and analyzing successive differentials. The differentials are used to determine peak power points in the power spectrum for display or use in analysis of voiced sound, such as for voice recognition. NASA

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N75-13594# Battelle-Northwest, Richland, Wash.

CALCULATION OF THE BINDING ENERGIES FOR DEFECT CLUSTERS

Dang Dinh Chung 8 Jul. 1974 23 p refs Transl. into ENGLISH from the French report CEA-R-4500

(BNWL-tr-119; CEA-R-4500) Avail: NTIS HC $3.25

Several models which are available are described: point defects (elastic, electronic contributions, atomic), interatomic potential, and crystal model. Calculation of the relaxation and of the energies is considered. Using the same interatomic potential model as R. A. Johnson, several calculations were made for several configurations of defects in alpha-iron. Results are given for six configurations or mono-interstitials, and divacancies and trivacancies. The probable configuration of the interstitial is crowdion; of trivacancy, 3V2; of divacancy, 2V2. The vacancies in the third, fifth, sixth, seventh, and ninth neighbor positions tend to be repelled. NSA

N75-13595# Scientific Translation Service, Ann Arbor, Mich.

ATOMIC COLLISIONS ON THE SURFACE OF A SOLID BODY

A. Kh. Ayukhanov, ed. [1973] 117 p refs Transl. into ENGLISH from the Russian report Sponsored by AEC Prepared for Oak Ridge Natl. Lab.

(ORNL-tr-2815) Avail: NTIS HC $5.25

Interactions of streams of corpuscular radiation with the surfaces of solid bodies are studied. The phenomena of dispersion, channeling, neutralization of ions, and emission of ions and electrons are considered and the effect of ion bombardment on physico-chemical properties of the surface is discussed.

Author (NSA)

N75-13596# Aerospace Research Labs., Wright-Patterson AFB, Ohio.

MEASUREMENT OF THE RATE OF DISSOCIATIVE ATTACHMENT OF ELECTRONS TO FLUORINE IN A FLOWING AFTERGLOW SYSTEM Interim Technical Report, Jan. 1973 - Jan. 1974

Gary D. Sides and Thomas O. Tiernan Jul. 1974 70 p refs (AF Proj. 7023)

(AD-786026; ARL-74-0105) Avail: NTIS CSCL 07/4

The dissociative attachment of low energy electrons to fluorine is a potential source of fluorine atoms in electrically initiated hydrogen-fluorine chemical laser systems. The ARL flowing

afterglow system was developed to measure the rate of this reaction. Electrons are produced in a microwave discharge and react with fluorine, and the resulting negative ions are sampled through an orifice at the end of a reaction channel. Two other reactions were also studied in the process of developing the experimental technique: the charge transfer reaction between diatomic negative oxygen ion and sulfur hexafluoride and electron attachment to sulfur hexafluoride. (Modified author abstract)
GRA

N75-13597# Brandeis Univ., Waltham, Mass. Dept. of Physics.
POSITRON, ELECTRON AND PHOTON INTERACTION EXPERIMENTS Final Report, 15 Dec. 1961 - 15 Dec. 1972
Stephan Berko 1974 10 p refs
(Grants DA-ARO(D)-31-124-70-G38; DA-ARO(D)-31-124-G233)
(AD-782887; AROD-3389-21-P) Avail: NTIS CSCL 20/12
The research involved the development and application of the positron Annihilation technique to various aspects of solid state physics. The experiments performed can be divided into three categories: (1) high precision angular correlation measurements; (2) 3 gamma/2 gamma yield measurements; (3) lifetime experiments. Materials studied included V3Si, Cu and Cu-Al alloys, V2O3 and quartz. Author (GRA)

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation*.

N75-13598# Tokyo Univ. of Education (Japan). Dept. of Physics.
SCALING AND DUALITY SCHEME IN DEEP INELASTIC PROCESSES
S. Sakai and N. Yamazaki Jul. 1974 43 p refs
(TUETP-74-12) Avail: NTIS HC $3.75
By using scaling and local two-component finite energy sum rule (FESR) duality, the sum rule which relates the q(2)-dependence of the resonance production cross section to the omega prime-dependence of upsilon W sub 2 in the continuum region was derived. The comparison of the resonance part of upsilon W sub 2 with the Regge part of upsilon W sub 2 was made and the sum rule was studied. It was found that if the FESR duality is modified to take the average over the region in which both nucleon pole and delta (1236) are included, the agreement of resonance and Regge part of upsilon W sub 2 is good. Upsilon W sub 2 satisfies both scaling and duality. The possible origin of fixed pole at J = 0 was found. It is not related to the nucleon pole (Born term) as the gedanken experiment showed, but is related to the bump structure of the background part of upsilon W sub 2 in the resonance region. A scheme of duality in photon (virtual and real) induced reactions is presented. Author

N75-13599# Central Electricity Generating Board, Berkeley (England). Nuclear Labs.
AUGER ELECTRON SPECTROSCOPY AT BNL
R. K. Wild Feb. 1974 41 p refs
(RD/B/N-2961) Avail: AEC Depository Libraries HC $5.25
Developments in Auger electron spectroscopy are reviewed. A brief description is given of the Auger process and the factors involved in achieving quantitative determination with the technique. Methods used in the detection of Auger electrons are outlined and the system in use at Berkeley Nuclear Laboratories (BNL) is described. Examples of the application of AES are given and illustrated by work carried out at BNL. Author

N75-13600# Argonne National Lab., Ill.
PROCEEDINGS OF THE SYMPOSIUM ON ADVANCED TECHNOLOGY ARISING FROM PARTICLE PHYSICS RESEARCH
R. C. Arnold, ed., G. H. Thomas, ed., and B. W. Wicklund, ed. 1973 203 p refs Presented at the Symp. on Advanced Technol. Arising from Particle Phys. Argonne, Ill., 17 May 1973
(Contract W-31-109-eng-38)
(ANL-8080; Conf-730541) Avail: NTIS HC $7.25
The conference included 20 papers, four of which were abstracted previously in NSA. For abstracts of these papers see CONF-730541 in a cumulative report number index. Separate abstracts were prepared for eight papers. Other papers were outside the subject scope of NSA. NSA

N75-13601# Los Alamos Scientific Lab., N.Mex.
CTR BREAKEVEN INCLUDING ENERGY TRANSFER AND RECOVERY EFFICIENCIES
D. A. Freiwald and R. A. Gerwin Jun. 1974 7 p refs
(Contract W-7405-eng-36)
(LA-5640-MS) Avail: NTIS HC $3.25
Breakeven conditions for controlled thermonuclear reactions (CTR) are addressed. Simple but general equations are presented which include energy transfer and recovery efficiencies for energies in various forms. A general equation for breakeven is developed, showing the sensitivity of the efficiency factors. Each experiment will have its own breakeven curve, depending on the energy transfer at recovery efficiencies. Author (NSA)

N75-13602# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Reaktorwerkstoffe und Heisse Zellen.
PYROCARBON, AN IMPORTANT MATERIAL FOR HIGH TEMPERATURE GAS COOLED REACTORS
E. Gyarmati, K. Koizlik, P. Krautwasser, H. Luhleich, H. Nickel, and H. A. Schulze Mar. 1974 30 p refs
(JUL-1052-RW) Avail: AEC Depository Libraries HC $4.50
The present state of pyrocarbon technique is summarized for application to reactor technology. Deposition methods are described as well as the methods for characterization of the pyrocarbon deposits. Latest results of structural analysis of this material are presented. Theoretical model conceptions of pyrolysis and deposition mechanism and of microphysical processes during neutron irradiation and heat treatment of pyrocarbon coated fuel particles are described, and the experiments, which these models are based upon. Author (NSA)

N75-13603# Brookhaven National Lab., Upton, N.Y.
METHOD TO DETERMINE THE MINIMUM COST MEASUREMENT PLAN CONSISTENT WITH ANY FEASIBLE LIMIT OF ERROR ON MUF
J. P. Indusi and W. Marcuse 4 Jun. 1974 19 p refs Presented at Meeting of Inst. of Nucl. Mater. Management, Atlanta, 19 Jun. 1974 Sponsored by AEC
(BNL-18969; Conf-740622-8) Avail: NTIS HC $3.25
Measured values for all flow and inventory quantities are required for nuclear materials safeguards and are necessary for nuclear materials control. A vast number of measurement strategies are available for measuring feed, product, discard, recycle and intermediate products, to generate a material balance and the error (LEMUF) associated with the balance. In addition, each bulk measurement, sample taken, and analysis has an associated cost, and hence, each measurement strategy generates a total cost. Given the cost associated with each of the measurement variables, an algorithm has been written that seeks the minimum cost solution for any feasible limit of error. Many strategies are dominated in the sense that the same LE can be attained at a lower cost or a smaller LEMUF can be achieved at the same cost. The algorithm and two examples of its application are described. Author (NSA)

N75-13604# Istituto Nazionale di Fisica Nucleare, Rome (Italy).
SPECIAL RELATIVITY EXTENDED TO SUPERLUMINAL FRAMES AND OBJECTS (CLASSICAL THEORY OF TACHYONS)
R. Mignani and E. Recami 15 Nov. 1973 67 p refs
(INFN/AE-73/7) Avail: AEC Depository Libraries HC $6.50
A review is given of the classical theory of superluminal objects. The so-called causal paradoxes are also investigated and clarified. Particular attention is paid to the symmetries required by extended relativity: for example, the crossing relations and the CPT theorem are derived. NSA

N75-13605# Mound Lab., Miamisburg, Ohio.
MOUND LABORATORY ISOTOPIC POWER FUELS PROGRAMS, JANUARY - JUNE 1974
9 Aug. 1974 25 p refs
(Contract AT-(33-1)-GEN-53)
(MLM-2166) Avail: NTIS HC $3.25

Progress is reported on the development of (Pu-238)O2 Multihundred Watt fuel spheres. NSA

N75-13606# Los Alamos Scientific Lab., N.Mex.
RELATIONSHIP OF FABRICATION PARAMETERS TO SELECTED PROPERTIES OF (Pu-238)O2 RADIOISOTOPIC FUELS 1: DIMENSIONAL CHANGES, STOICHIOMETRIES, AND MICROSTRUCTURAL FEATURES
T. K. Keenan, R. A. Kent, and R. W. Zocher May 1974 19 p refs
(Contract W-7405-eng-36)
(LA-5622-MS) Avail: NTIS HC $3.25

Fabrication parameters and selected properties of Pu-238 O2 have been examined by observing the responses of the material to a wide variety of thermal and mechanical stresses. The initial phase of this study concentrated on the microstructural appearance of the fuel following its fabrication under varying conditions. The parameters examined included variations in: (1) feed granule size ranges; (2) cold pressing pressures; (3) pre-press seasoning temperatures; (4) hot pressing pressures; and (5) post-press sintering temperatures. The structural differences were correlated with these processing parameters. Author (NSA)

N75-13607# Los Alamos Scientific Lab., N.Mex.
PREPARATION AND EVALUATION OF MEDICAL-GRADE PLUTONIUM-238 FUELS, 1 JULY 1971 - 30 JUNE 1973
L. J. Mullins, comp. May 1974 46 p refs
(Contract W-7405-eng-36)
(LA-5506-PR) Avail: NTIS HC $3.75

Work has continued on the preparation and properties of medical grade (Pu-238)1602 fuel forms for the artificial heart program. Procedures were developed for fabricating the 33-W fuel cylinder for the artificial heart vented capsule. Three sources were fabricated and delivered for encapsulation in vented capsules. One 50-W and five 29-W nonvented heat sources were fabricated for animal implantation studies. Studies of helium and radon release rates from medical grade fuel forms have been initiated and are in progress. The characterization of Pu-238 fuel forms by nondestructive techniques and chemical analysis has continued. Author (NSA)

N75-13608# California Univ., Livermore. Lawrence Livermore Lab.
RELATION OF THE MIRROR CONCEPT TO OTHER MAGNETIC APPROACHES TO FUSION POWER
T. K. Fowler 25 Jul. 1974 14 p
(Contract W-7405-eng-48)
(UCID-16564) Avail: NTIS HC $3.25

Injection and heating concepts for magnetic mirrors, toroidal theta pinches, and tokamaks are discussed. The power amplification factor Q is compared along with the beta ratio and engineering simplicity of the three approaches. NSA

N75-13609# Oak Ridge National Lab., Tenn.
FUSION CHAIN REACTOR PROSPECTS AND PROBLEMS
J. R. McNally, Jr. Jul. 1974 64 p refs
(Contract W-7405-eng-26)
(ORNL-TM-4575) Avail: NTIS HC $4.25

A fusioning plasma in a magnetic mirror is considered which is closed by the self-magnetic field of a trapped ring current of ions with the electrons sustained at MeV energies principally by electron cyclotron heating. Reaction kinetics studies of DxHe-3 fueled plasmas in partially closed mirrors give MeV energies for the average energies of the light fusion reaction product ions which are the necessary catalysts or active chain centers for the propagation of such fusion chain reactions. In a closed magnetic mirror or I-layer, the energetic charged reaction products may sustain both the I-layer configuration as a result of nutational motion and burning conditions, and may also lead to the sub-critical start-up of supplemental linear or toroidal multiple mirror reactors in which the electron temperature is also sustained by ECH in small systems. Author (NSA)

N75-13610# Oak Ridge National Lab., Tenn.
REACTIVITY OF ADVANCED FUSION FUELS
J. R. McNally, Jr. Jul. 1974 25 p refs
(Contract W-7405-eng-26)
(ORNL-TM-4647) Avail: NTIS HC $3.25

The advanced fusion fuels DxD and Li6xD offer significant advantages for future fusion reactors including the capability of pulsed or steady state burning in high beta reactors (closed mirrors, delta-pinch, plasma focus) or inertially confined, high density systems. Some of the operational features of high beta systems are presented in support of these prospects. Author (NSA)

N75-13611# California Univ., Livermore. Lawrence Livermore Lab.
EXOTIC CTR FUELS: NON-THERMAL EFFECTS AND LASER FUSION APPLICATIONS
T. Weaver, G. Zimmerman, and L. Wood 30 Oct. 1973 13 p Presented at the Ann. Plasma Phys. Meeting of the Am Phys. Soc., Philadelphia, 31 Oct. 1973 Sponsored by AEC
(UCRL-74938; Conf-731009-10) Avail: NTIS HC $3.25

Exotic fusion fuel systems are defined as those that would not be subject to such difficulties as present fuel cycles. Ideally, such a fuel system would involve no neutron- or radionuclide-producing reactions, have cheap and inexhaustibly available reactants, output most of its energy as charged particles, and have a sufficiently high energy-generation rate to be usable in projected laser fusion or other CTR systems. The light elements were searched for such reactions and one promising candidate was found in the reaction: p + B-11 yields 3He-4, + 8.68 MeV. In certain modes of reactor operation, this reaction appears capable of substantially satisfying all of the above criteria. Other possibly fuel combinations include: p(Li-6), d(Li-6), p(Be-9), d(Be-9), p(B-10), and p(N-15), though these suffer from relatively low reaction rates and in some cases substantial neutron and radionuclide production. These cycles are discussed. NSA

N75-13612# California Univ., Livermore. Lawrence Livermore Lab.
TWO-STEP SELECTIVE PHOTOIONIZATION OF U-235 IN URANIUM VAPOR
S. A. Tuccio, J. W. Dubrin, O. G. Peterson, and B. B. Snavely 12 Jun. 1974 12 p Presented at the 8th Intern. Quantum Electron. Conf., San Francisco, 10 Jun. 1974 Sponsored by AEC
(UCRL-75696; Conf-740617-6) Avail: NTIS HC $3.25

Selective photoionization of U-235 was demonstrated in a beam of uranium vapor using a tunable CW dye laser and a Hg arc lamp. The ions thus generated were then separated from the atomic beam by means of electrostatic deflection. The apparatus in this experiment was set up primarily to evaluate various parameters associated with two step processes in uranium vapor; such as photoionization cross sections and excited state lifetimes. Author (NSA)

N75-13613# Illinois Univ., Urbana.
ADVANCED ENERGY CONVERSION FOR FUSION REACTORS WITH A SUBTASK ON CHARGE-EXCHANGE EFFECTS DURING NEUTRAL BEAM INJECTION Technical Progress Report, 31 Aug. 1973 - 1 Sep. 1974
G. H. Miley 1974 103 p refs
(Contract AT(11-1)-2218)
(COO-2218-18) Avail: NTIS HC $5.25

Research studies are discussed for the following: (1) potential advanced fuel cycles, (2) energy-balance calculations for high-temperature plasmas, and (3) two-component reactors for use with both D-T and advanced fuels. Some work on charge-exchange effects during neutral beam injection is also reported. NSA

74 OPTICS

Includes light phenomena.

N75-13614 Michigan Univ., Ann Arbor.
STUDIES IN dc-INDUCED OPTICAL SECOND-HARMONIC

GENERATION IN GASES Ph.D. Thesis
Irving Joseph Bigio 1974 128 p
Avail: Univ. Microfilms Order No. 74-25151

The following investigations were conducted using dc electric-field induced optical second-harmonic generation in gases: (1) the use of dc induced second-harmonic generation as a probe of the focal region of a laser beam, (2) measurement of the hyperpolarizability ratio for inert gases, and (3) determination of the temperature-dependence of the laboratory-frame coefficient for halogenated methanes. The test equipment used and the method for conducting the tests are described. The determination of laboratory coefficients in terms of isotropic orientational averages over molecular coefficients are reviewed and the experimental determination of the relative signs of the coefficients are discussed. Dissert. Abstr.

N75-13615 Utah Univ., Salt Lake City.
DIGITAL IMAGE DEBLURRING BY NONLINEAR HOMOMORPHIC FILTERING Ph.D. Thesis
Thomas Michael Cannon 1974 95 p
Avail: Univ. Microfilms Order No. 74-25999

The digital estimation of the frequency response of a two-dimensional linear system through which images have been passed and blurred is discussed. Almost no a priori knowledge concerning the system is required, and only one blurred image is necessary for a successful estimation. For those blurs that have phase reversals, such as motion blurs and out-of-focus blurs, a simple method of calculating the correct phase has been developed. A nonlinear homomorphic restoration system is developed and demonstrated on various types of blurred images. An image may be restored by filtering either the intensity version or the density version of the image. The latter not only insures a positive result but also permits simultaneous deblurring and contrast enhancement. The restoration procedure consumes only a modest amount of computation time. Dissert. Abstr.

N75-13616*# Kanner (Leo) Associates, Redwood City, Calif.
NEW METHODS OF STUDYING LENSES WITH REMARKS ON ASSESSING QUALITY
Y. Vaisala Washington NASA Dec. 1974 98 p refs Transl. into ENGLISH from Ann. Univ. Fennicae Aboensis (Turku), Ser. A, v. 1, no. 2, 1922 p 3-129
(Contract NASw-2481)
(NASA-TT-F-16097) Avail: NTIS HC $4.75 CSCL 20F

Quantitative methods are developed for determining the aberrations of objectives, utilizing interference effects. Zonal aberrations are found by several methods to ascertain the curvature of the light front and its deviation from a perfect sphere. Astigmatism and coma are also ascertained by these techniques. The methods are applied to two transits, a refracting telescope, and a parabolic mirror. Parameters reflecting the quality of a lens are discussed and compared. The methods and results are applied to objectives in various observatories on the basis of literature data. Author

N75-13617# McDonnell Aircraft Co., St. Louis, Mo.
ACTIVE MULTISPECTRAL DATA ANALYSIS Final Report, May 1973 - May 1974
J. Carl Leader, David P. Owsley, and Charles R. Fulkerson Aug. 1974 175 p refs
(Contract F30602-73-C-0212)
(AD-786032; RADC-TR-74-190) Avail: NTIS CSCL 17/8

A study was conducted for the systematic determination of the effects of various sensor parameters and environmental variables on the capability to identify target materials. The approach incorporated an experimental program of data collection and laboratory target signature measurements together with the development of a unique data analysis scheme. Targets were illuminated with a Krypton laser that produced visible light simultaneously in four spectral channels (0.65 micrometers, 0.57 micrometers, 0.52 micrometers, and 0.48 micrometers). The 1.5-watt beam, having a divergence of 1.6 mrad, was scanned horizontally across an existing test range. The primary target was a calibrated series of painted panels of various sizes, colors, and orientations. Parameters studied included gain, bandwidth, scan speed, field of view, color contrast, and surface moisture. Atmospheric transmission and background illumination were measured. (Modified author abstract) GRA

N75-13618# Stanford Research Inst., Menlo Park, Calif.
REAL-TIME CORRECTION OF ATMOSPHERICALLY DEGRADED TELESCOPE IMAGES THROUGH IMAGE SHARPENING
Richard A. Muller and Andrew Buffington Jul. 1974 50 p refs
(Contract DAHC15-73-C-0370)
(AD-786157; SRI-JSR-73-9) Avail: NTIS CSCL 03/1

A new technique for the correction of atmospheric distortion in a telescope is presented. Most of this distortion arises from a random phase variation in the incoming light across the telescope aperture. This variation limits the resolving power of even large telescopes to about one second of arc. If one defines the sharpness value of the images in a suitable way, this sharpness is maximized only when the phase distortion of the incoming light is zero. The report presents computer simulations of a simple feedback system in which flexible optical elements, adjusted to maximize the sharpness, correct most of the atmospheric distortion. (Modified author abstract) GRA

N75-13619# Optical Science Consultants, Yorba Linda, Calif.
THEORETICAL STUDY OF NON-STANDARD IMAGING CONCEPTS Interim Technical Report, 15 Jan. - 15 May 1974
David L. Fried May 1974 75 p refs
(Contract F30602-74-C-0115; ARPA Order 2646)
(AD-783276; RADC-TR-74-185) Avail: NTIS CSCL 20/6

This report presents the more significant and complete results to date on a program of theoretical study related to unconventional imagery and techniques for suppression of atmospheric turbulence effects on image quality. The objective of this work has been to develop an understanding and quantitative theory of those aspects of propagation through atmospheric turbulence that would limit the performance of unconventional imagery techniques, and to develop a basis for quantifying the effective magnitude of atmospheric turbulence. Results of an analysis of the isoplanatic aspects of predetection compensation imagery are given. GRA

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N75-13620 Princeton Univ., N.J.
A CONTINUUM THEORY FOR THE INTERACTION OF A WEAKLY IONIZED GAS WITH AN EMITTING SURFACE Ph.D. Thesis
Juris Kalnavarns 1974 154 p
Avail: Univ. Microfilms Order No. 74-25957

The effects of surface electron emission and incomplete absorption on the behavior of a stationary, collision-dominated, weakly ionized gas in the vicinity of a spherical probe are analyzed both in the limit of isothermal electrons and in the limit where an electron energy balance yields a variable temperature. A Knudsen layer argument relates the surface boundary conditions on the macroscopic variables to the imposed molecular conditions at the wall. Two levels of electron emission which arise naturally from the formulation are considered. As long as the microscopic electron current leaving the surface is of the order of the product of the plasma random current and the ratio of sheath thickness to probe radius, the isothermal electron case and the non-isothermal electron case with ion and electron temperatures of the same order of magnitude can be treated within the formalism of the perfectly absorbing wall analysis with only altered surface boundary conditions. Dissert. Abstr.

N75-13621 Cornell Univ., Ithaca, N.Y.
SILICON AVALANCHE DIODE OSCILLATIONS IN THE TRAPPED PLASMA MODE Ph.D. Thesis
Hing-Loi Alfred Hung 1974 163 p
Avail: Univ. Microfilms Order No. 74-24246

Microwave oscillations with silicon avalanche diodes in the trapped plasma mode were examined through actual device fabrication, circuit design, oscillator characterization and computer analysis. Investigations on material characteristics, device

structures, saturation currents and outdiffusion effects resulted in improved design and construction of TRAPATT diodes of both complementary (p (+) nn (+) and n (+)pp (+)) types. Vacuum diffusion for junction formation and dc sputtering for ohmic and Schottky-barrier contacts were the main processes utilized. Oscillations with diodes in coaxial and waveguide circuits were obtained in frequencies ranging from L-band to X-band. The maximum DC to RF conversion efficiency was 54% with an output power of 33 watts at 1.26 GHz. In the high frequency range, an efficiency of 11.5% at 9.1 GHz was achieved.
Dissert. Abstr.

N75-13622 Texas Univ., Austin.
A RADIO FREQUENCY ASSISTED MAGNETIC MIRROR Ph.D. Thesis
Robert Benton Howell 1972 134 p
Avail: Univ. Microfilms Order No. 74-24882

A radio frequency assisted magnetic mirror was used to study the possibility of enhanced plasma reflection in a magnetic bottle. A singly ionized lithium plasma was created which had its main energy along the axis of the magnetic bottle. Radio frequency electric fields were applied by means of a capacitor plate antenna located at the neck of the bottle. Various diagnostic equipment was used to detect the plasma as it passed through the mirror or was reflected back. The physical basis of this experiment was that particles can be given additional perpendicular energy which causes them to be turned by the gradient of the magnetic field. To supply the electric field at the site of the particle, a plasma resonance frequency was used. The resonance theoretically also allows the fields to become large which is necessary away from the cyclotron resonance. The resonance used was the lower hybrid frequency. Dissert. Abstr.

N75-13623 Case Western Reserve Univ., Cleveland, Ohio.
MICROWAVE NOISE FROM AN INERTIA CONTROLLED NEON DISCHARGE Ph.D. Thesis
Richard Owen Shaffner 1974 113 p
Avail: Univ. Microfilms Order No. 74-25677

The microwave noise detected by external capacitive probes over an octave in frequency, including the electron plasma frequency of an inertia controlled neon column, has been observed. The noise was of varied character determined by the pressure and behavior of the sheath at the heated cathode. At high pressure (50 microns) an axial standing wave existed while low pressure (20 microns) produced a collection of peaks in frequency. The cathode sheath could cause the peaks to be a regularly spaced series independent of position or an irregular collection both in space and frequency. Correlation of the signals from a probe pair revealed the fields of the peaks to be dipolar and those of the standing wave to be symmetric about the column. A speculative model including a detailed discussion of the discharge is proposed to explain the observations. Dissert. Abstr.

N75-13624 Michigan Univ., Ann Arbor.
THEORETICAL STUDIES OF EXPLODING WIRE AND LASER HEATED PINCH PLASMAS Ph.D. Thesis
David Lambert Chapin 1974 215 p
Avail: Univ. Microfilms Order No. 74-25171

A magnetohydrodynamic (MHD) model was developed to describe the dynamics of both linear z-pinch and theta-pinch plasmas, as well as dense exploding wire plasmas. The MHD model used in the study is comprised of Ohm's Law, Maxwell's equations, and the hydrodynamic equations modified to include electromagnetic terms. Separate electron and ion temperatures with both finite electrical conductivity and thermal conductivities are used. The system of equations in one-dimensional (radial), cylindrical geometry is solved numerically by a computer code. The model was generalized to describe as well the absorption of laser light in such plasmas. Two distinct types of plasmas were studied theoretically using this MHD model. The first application was an analysis of an exploding wire plasma while the second application involved laser heating of a dense plasma. Dissert. Abstr.

N75-13625* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SELF-ENERGIZED PLASMA COMPRESSOR Patent
Edward L. Shriver (NAS-NRC) and Eduard B. Igenbergs, inventors (to NASA) (NAS-NRC) Issued 10 Dec. 1974 4 p Filed 6 Jun. 1973 Supersedes N73-26721 (11 - 17, p 2067) Sponsored by NASA
(NASA-Case-MFS-22145-1; US-Patent-3,854,097; US-Patent-Appl-SN-367606; US-Patent-Class-328-233; US-Patent-Class-176-3; US-Patent-Class-313-63; US-Patent-Class-315-111) Avail: NTIS Avail: US Patent Office CSCL 20I

The self-energized plasma compressor is described which compresses plasma discharged from a coaxial plasma generator. The device includes a helically shaped coil which is coaxially aligned with the center axis of the coaxial plasma generator. The plasma generator creates a current through the helical coil which, in turn, generates a time varying magnetic field that creates a force which acts radially upon the plasma. The coaxial plasma generator and helical coil move the plasma under high pressure and temperature to the narrow end of the coil. Positioned adjacent to the narrow end of the coil are beads which are engaged by the plasma to be accelerated to hypervelocities for simulating meteoroids. Official Gazette of the U.S. Patent Office

N75-13626 Stanford Univ., Calif.
COMPUTATIONAL STUDY OF NONLINEAR PLASMA WAVES Ph.D. Thesis
Yoshiyuki Matsuda 1974 174 p
Avail: Univ. Microfilms Order No. 74-20211

A low-noise plasma simulation model is developed, and applied to a series of linear and nonlinear problems associated with electrostatic wave propagation in a one-dimensional, collisionless, Maxwellian plasma, in the absence of magnetic field. It is demonstrated that use of the hybrid simulation model allows economical studies to be carried out in both the linear and nonlinear regimes with better quantitative results, for comparable computing time, than can be obtained by conventional particle simulation models, or direct solution of the Vlasov equation. The characteristics of the hybrid simulation model itself are first investigated, and it is shown to be capable of verifying the theoretical linear dispersion relation at wave energy levels as low as 000001 of the plasma thermal energy. It is concluded that the hybrid simulation model constitutes a reliable and economical tool for use in the study of plasma phenomena.
Dissert. Abstr.

N75-13627*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF ANODE RING ARRANGEMENT ON THE SPECTROSCOPIC CHARACTERISTICS OF THE NASA LEWIS BUMPY TORUS PLASMA
Richard W. Richardson 1974 18 p refs Presented at 16th Ann. Meeting of the Plasma Phys. Division of the Am. Phys. Soc. Albuquerque, New Mexico, 28-31 Oct. 1974.
(NASA-TM-X-71636; E-8177) Avail: NTIS HC $3.25 CSCL 20I

The modified Penning discharge in the NASA Lewis Bumpy Torus is normally produced by an anode ring at high voltage in each of the 12 magnetic mirror midplanes. For this investigation, the plasma was run with 12, 6, 3, and 1 anode rings. When 3 anode rings were used, the spectroscopically determined relative electron density and mean ion residence time increase by factors of 10 and 5, respectively, in one mode of operation. The discharge is observed to uniformly fill all bumps around the torus regardless of the anode arrangement and number. A plasma density on axis of 10 to the 11th power cm/3 is estimated for the 3 anode case in one mode of operation based on an observed discharge current to ion loss rate correlation and a measured mean ion residence time of .5 msec. Author

N75-13628*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ION HEATING AND CONTAINMENT IN THE NASA LEWIS BUMPY TORUS PLASMA
J. Reece Roth 1974 16 p refs Presented at the 16th Ann. Meeting of the Plasma Phys. Div. of the Am. Phys. Soc., Albuquerque, New Mex., 28-31 Oct. 1974
(NASA-TM-X-71630; E-8157) Avail: NTIS HC $3.25 CSCL 20I

Experimental observations have been made during steady state operation of a torus experiment at input powers up to

150 kilowatts in deuterium and helium gas. The steady state ion heating method utilizes a modified Penning discharge operated in a bumpy torus confinement geometry. The bumpy torus plasma is acted upon by a combination of strong electric and magnetic fields. In a deuterium plasma, electron temperatures from 14 to 140 electron volts and ion kinetic temperatures from 160 to 1785 electron volts were observed. At least two distinct operating regimes exist, each of which is associated with a characteristic range of background gas pressure and electron temperature. Experimental data show that the average ion residence time in the plasma is virtually independent of magnetic field strength.
Author

N75-13629*# Princeton Univ., N.J. Guggenheim Aerospace Propulsion Labs.
ACCELERATION PROCESSES IN THE QUASI-STEADY MAGNETOPLASMADYNAMIC DISCHARGE Ph.D. Thesis
Michael John Boyle Oct. 1974 137 p refs
(Grant NGL-31-001-005)
(NASA-CR-141103; Rept-1188) Avail: NTIS HC $5.75 CSCL 20I

The flow field characteristics within the discharge chamber and exhaust of a quasi-steady magnetoplasmadynamic (MPD) arcjet were examined to clarify the nature of the plasma acceleration process. The observation of discharge characteristics unperturbed by insulator ablation and terminal voltage fluctuations, first requires the satisfaction of three criteria: the use of refractory insulator materials; a mass injection geometry tailored to provide propellant to both electrode regions of the discharge; and a cathode of sufficient surface area to permit nominal MPD arcjet operation for given combinations of arc current and total mass flow. The axial velocity profile and electromagnetic discharge structure were measured for an arcjet configuration which functions nominally at 15.3 kA and 6 g/sec argon mass flow. An empirical two-flow plasma acceleration model is advanced which delineates inner and outer flow regions and accounts for the observed velocity profile and calculated thrust of the accelerator.
Author

N75-13630# Nagoya Univ. (Japan). Inst. of Plasma Physics.
SOME ASPECTS ON TOKAMAKS WITH NONCIRCULAR CROSS SECTION
Jean Jacquinot Aug. 1974 22 p refs
(IPPJ-195) Avail: NTIS HC $3.25

The use of Tokamak experiments to investigate scaling laws in the collisionless regime and to optimize plasma parameters for better and more economical performance is reported. Discussions were also held on free parameters of Tokamaks including magnetic field, size, aspect ratio, and shape. Basic properties of Tokamaks are also reviewed.
Author

N75-13631# Nagoya Univ. (Japan). Inst. of Plasma Physics.
COUPLED ELECTRON-PLASMA AND ION ACOUSTIC SOLITONS EXCITED BY PARAMETRIC INSTABILITY
H. Ikezi, K. Nishikawa (Hiroshima Univ.), H. Hojo (Hiroshima Univ.), and K. Mima (Hiroshima Univ.) Oct. 1974 12 p refs Presented at the 5th Intern. Conf. on Plasma Phys. and Controlled Nucl. Fusion Res.
(IPPJ-196) Avail: NTIS HC $3.25

The nonlinear stationary state of the parametric instability of a one-dimensional electron plasma wave is theoretically and experimentally studied. Self-modulation of the high frequency electric field is observed when its frequency is near the electron plasma frequency. The localized field due to the self-modulation is found to make depressions in the plasma density, and to be trapped in the density dip which moves with the ion-acoustic speed. The maximum amplitudes of the high frequency field and the density dip are linearly proportional to each other. These features are quantitatively explained by the results of the theory of coupled electron plasma and ion-acoustic solitary waves.
Author

N75-13632# Nagoya Univ. (Japan). Inst. of Plasma Physics.
EXPERIMENT ON STP: AN AXISYMMETRIC FAST TOROIDAL PINCH WITH VERY SMALL ASPECT RATIO
K. Hirano, S. Kitagawa, M. Mimura, Y. Kita, M. Ohi (Osaka Univ.), T. Amano (Osaka Univ.), and M. Wakatani (Japan Atomic Energy Res. Inst.) Oct. 1974 25 p refs Presented at the 5th Intern. Conf. on Plasma Phys. and Controlled Nucl. Fusion Res.
(IPPJ-197; IAEA-CN-33/E9-5) Avail: NTIS HC $3.25

A high beta fat tokamak configuration operated under a small q value is tested. The maximum ion and electron temperatures are 500 and 100 ev, respectively, while a plasma density about 1 x 10 to the 15th power/cu cm is observed. A violent toroidal drift appears after the pinch implosion and a large amount of the plasma energy is lost within 10 micro sec. However, application of pulsed vertical field of about 480 G dramatically changes this situation. Movable magnetic probe measurements show that, with the vertical field, the plasma pressure at 17.6 micro sec after the start of the main discharge is 3 x 10 to the 17th power eV/cu cm. Large signals of m = 2 mode appear when the sub Bp signal of eight pick-up loops around the minor circumference of the torus is transformed into Fourier components. The m = 2 mode becomes small when the high beta operation with negative bias field is done.
Author

N75-13633# Nagoya Univ. (Japan). Inst. of Plasma Physics.
DYNAMIC BEHAVIOR OF TURBULENT HEATING OF PLASMAS
Y. Nakagawa, M. Tanikawa, K. Watanabe, K. Adati, H. Iguchi, K. Ishii, Y. Ito, J. Jacquinot, T. Kawabe, T. Kawamura et al Oct. 1974 21 p refs Presented at 5th Intern. Conf. on Plasma Phys. and Controlled Nucl. Fusion Res. Prepared in cooperation with Osaka City Univ., Tokyo Univ. of Educ., Hiroshima Univ., CEA, Fontenay-aux-Roses, France, and Kyushu Univ.
(IPPJ-198) Avail: NTIS HC $3.25

Dynamical behaviors of turbulently heated plasma have been studied experimentally in three linear machines by using a particle energy analyzer, spectrometer and ruby laser. Measurement of ion energy distribution by charge exchanged neutrals showed that a bump was observed in the high energy component during the course of resistive hump in the discharge current for the heating; the temperature of the low energy component became lower as the plasma density increased, while those of the high energy component didn't change. Fluctuation measurement indicated that intense electric potential oscillations with frequencies around 10 MHz appear in the period of resistive hump, which was considered to be responsible for heating and accelerations of ions.
Author

N75-13634# Nagoya Univ. (Japan). Inst. of Plasma Physics.
PLASMA CONFINEMENT IN HYBRID STELLARATOR WITH L EQUALS 2 AND L EQUALS 3 HELICAL FIELDS
K. Miyamoto, M. Fujiwara (Tokyo Univ. of Educ.), K. Kawahata, Y. Terashima, T. Dodo (Hitachi Ltd.), and K. Yatsu Oct. 1974 12 p refs Presented at 5th Intern. Conf. on Plasma Phys. and Controlled Nucl. Fusion Res.
(IPPJ-199) Avail: NTIS HC $3.25

Dependences of plasma transport on the rotational transform angle and the shear as well as the plasma parameters are studied using JIPP Ib stellarator which equips both l=2 and l=3 helical windings. Afterglow plasmas produced by electron cyclotron resonant heating and P.I.G. discharge are used. The properties of the resonant losses observed in the afterglow plasmas in the rational cases of the l=2 stellarator field are investigated and the shear effect on the resonant losses is examined by superposing the l=3 helical field. It is found that the plasma loss is due to the onset of dissipative drift instability including toroidal effects. Weak shear reduces resonant loss. Ohmic heating of plasma is carried out with a programmed vertical field for equilibrium.
Author

N75-13635# Nagoya Univ. (Japan). Inst. of Plasma Physics.
ION CYCLOTRON HEATING OF A PLASMA AND ENERGY CONFINEMENT IN A TOROIDAL QUADRUPOLE
T. Takizuka (Kyoto Univ.), H. Abe (Kyoto Univ.), H. Momota (Kyoto Univ.), and C. Namba Sep. 1974 49 p refs
(IPPJ-200) Avail: NTIS HC $3.75

With the use of RF electric fields, the heating of the plasma and the improvement in the energy confinement are studied for an open-ended toroidal quadrupole. After analyzing loss mechanisms of the plasma and the heating rate, both theoretically and numerically, some optimizations have been made. The resultant heating and energy confinement are exhibited in computer experiments. The plasma can be heated easily and an

improvement in the energy containment time of approximately 10% is obtained. Author

N75-13636# Nagoya Univ. (Japan). Inst. of Plasma Physics.
ENHANCEMENT OF DAMPING OF LARGE AMPLITUDE WAVE
Ryo Sugihara and Kaoru Yamanaka Sep. 1974 13 p refs
(IPPJ-201) Avail: NTIS HC $3.25

Evaluating the exact population difference between resonant electrons with velocities smaller and larger than the phase velocity, a correction to Landau damping proportional to the square of the wave amplitude is obtained theoretically. Author

N75-13637# Nagoya Univ. (Japan). Inst. for Plasma Physics.
AN ADIABATIC RF PLUGGING SCHEME FOR A CONTROLLED FUSION REACTOR
T. Hatori, T. Watanabe, H. Obayashi, T. Sato, S. Hiroe, T. Watari, T. Shoji, K. Adati, J. Jacquinot, and A. Miyahara Oct. 1974 19 p refs Presented at 5th Intern. Conf. on Plasma Phys. and Controlled Nucl. Fusion Res.
(IPPJ-202) Avail: NTIS HC $3.25

The concept of adiabatic RF plugging applied to the cusp system has been investigated both theoretically and experimentally. In the line and point cusps the plasma dimension across the magnetic field can be of the order of the ion Larmor radius. The condition for the RF field to form a quasi-potential barrier against a charged particle is discussed theoretically. The structure of this quasi-potential is also demonstrated by various experiments done with a simple cusp device. A new scheme of plasma confinement system, composed of a straight cylinder terminated by magnetic cusps with the adiabatic RF plugs, is proposed as a possible prototype of the fusion reactor. This system is characterized by the moderate operating temperature, the impurity-free confinement, and no loss cone instabilities. Author

N75-13638# Nagoya Univ. (Japan). Inst. of Plasma Physics.
THERMONUCLEAR FUSION PLASMA PRODUCED BY LASERS
C. Yamanaka, M. Yokoyama, S. Nakai, T. Sasaki, K. Yoshida, M. Matoba, C. Yamabe, T. Yamanaka, J. Mizui, N. Yamaguchi et al Oct. 1974 12 p refs Prepared in cooperation with Osaka Univ. and Hiroshima Univ.
(IPPJ-203) Avail: NTIS HC $3.25

The coupling of laser light and plasma was studied by performing laser bombarding experiments on hydrogen and deuterium stick targets using a glass laser system, energy 50 J in nanosecond pulse, and a double discharge TEA CO2 laser system, energy 100 J in 100 nanoseconds pulse. The decrease of reflectivity has appeared at laser intensity of one order larger than the threshold of the parametric instability. The phase modulation of the scattered light due to modulational instability was found. An isotope effect of Brillouin backscattering from the hydrogen and deuterium plasma has also been observed in the red side part of the SHG light. The development of high power lasers has been promoted such as disc glass lasers, E-beam CO2 lasers and excimer lasers. Author

N75-13639# Nagoya Univ. (Japan). Inst. of Plasma Physics.
A keV COLLISIONLESS THETA-PINCH PLASMA CONFINED IN THE CAULKED-CUSP TORUS (CCT) FIELD
T. Uchida (Tokyo Univ.), K. Sato, N. Noda, T. Aizawa (Tokyo Metropol. Tech. Coll.), Y. Osanai (Nihon Univ.), T. Itagaki, and R. Akiyama Oct. 1974 12 p refs Presented at the 5th Intern. Conf. on Plasma Phys. and Controlled Nucl. Fusion Res.
(IPPJ-204) Avail: NTIS HC $3.25

It is demonstrated that a theta pinch plasma produced at low pressure regime is confined stably for a longer time in the caulked cusp torus field. Energy distribution of particles of the theta pinch plasma is investigated by means of energy analysis of fast neutral particles emitted from the confined plasma. It is found that the plasma confinement time is limited to 80 microseconds by the decrease of the confining field strength due to the decay of the crowbarring current and the induced ring current, while the density decay time is estimated to be 120 microseconds. Author

N75-13640# Osaka City Univ. (Japan). Research Inst. for Atomic Energy.
DYNAMIC BEHAVIOR OF TURBULENT HEATING OF PLASMAS
Y. Nakagawa, M. Tanikawa, K. Watanabe, K. Adati (Nagoya Univ.), H. Iguchi (Nagoya Univ.), K. Ishii (Tokyo Univ. of Educ.), Y. Ito (Hiroshima Univ.), J. Jaquinot (CEA, Fontenay-aux-Roses, France), T. Kawabe (Nagoya Univ.), T. Kawamura (Nagoya Univ.) et al [1974] 6 p refs
(IAEA-CN-33/C-3) Avail: NTIS HC $3.25

In an investigation of mass dependence of ion heating, a chamber was filled with a mixture of gases at a pressure of 0.0002 torr. The mixture consisted of 84% helium, and four test ion gases (neon, krypton, and xenon) at 4% each. Ion velocity distribution perpendicular to the magnetic field was measured from Doppler broadening of ion spectral lines of each species. The line width broadened at about 0.3 to 0.5 microns after the onset of the current and increased in the next 0.5 microns, where it reached its maximum value. The temperature of the cold component of each test species was about one hundred eV, while that of the hot component was several hundred eV. The heavier ions reached higher temperatures. Doppler shift for the ion lines were also observed, suggesting the existence of mass motions of the ions in the plasma, with a velocity of about 10 to the 6th power cm/s for all species of the ions. Author

N75-13641# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
A REVIEW OF THE STATUS OF MHD POWER GENERATION TECHNOLOGY INCLUDING SUGGESTIONS FOR A CANADIAN MHD RESEARCH PROGRAM
P. C. Stangeby Nov. 1974 154 p refs
(UTIAS-39) Avail: NTIS HC $6.25

The fundamentals of MHD power generation technology are reviewed, and the economic aspects of MHD are considered. Special MHD applications are analyzed, including: (1) H2-02-Cs MHD peaking, and (2) tar sand processing by rapid devolatilization with or without MHD. Recommendations for a Canadian R and D program are outlined, along with estimated costs. Author

N75-13642# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France).
ENERGY STORABLE IN SUPERCONDUCTING RESONANT CAVITIES
J. Reuss Jan. 1974 26 p refs In FRENCH
(EUR-CEA-FC-725) Avail: AEC Depository Libraries HC $4.50

Superconducting resonant cavities can have overvoltage coefficients as high as 10 to the 11th power. Up to the present time, however, the amount of energy that can be stored in this way is small, because of the fact that the hf magnetic induction along the walls cannot exceed about 0.1T without a considerable drop in Q-value occurring. Nevertheless, no theoretical limit has been clearly established for the maximum hf induction amplitude. It is possible that new superconducting materials will be developed permitting the storage of larger amounts of energy. For a given amount of stored energy, the power of the supply generator varies inversely with the level of helium consumption. If a large increase in magnetic induction could be achieved, these two factors might constitute technological and economic limitations to the exploitation of this phenomenon. Although the problems associated with the use of such stored energy are only briefly mentioned, they may be considerable. NSA

N75-13643# California Univ., Berkeley. Lawrence Berkeley Lab.
HIGH-FREQUENCY STARK EFFECT AND ITS APPLICATION TO PLASMA DIAGNOSTICS Ph.D. Thesis
W. W. Hicks Dec. 1973 174 p refs
(Contract W-7405-eng-48)
(LBL-2470) Avail: NTIS HC $6.25

A theoretical and experimental study is presented of the high frequency Stark effect of hydrogen and helium spectral lines. The theory starts from Schroedinger's equation for an atom in a monochromatic high frequency electric field and a static magnetic field, and following a method due to Autler and Townes, reduces the problem to an equivalent problem of diagonalizing a matrix equation. The general solution of this matrix equation

is discussed in some detail, the photon emission spectrum is calculated for the general case and for typical cases of hydrogen-like and helium-like spectral lines, and a physical interpretation of this solution in terms of multi-quantum transitions is developed. Calculated profiles of several spectral lines of both hydrogen and helium for a variety of electric field parameters are presented. Author (NSA)

N75-13644# Atomic Energy Commission, Washington, D.C.
STATUS AND OBJECTIVE OF TOKAMAK SYSTEMS FOR FUSION RESEARCH
1974 111 p refs
(WASH-1295) Avail: NTIS HC $5.25

The following topics related to Tokamak research are discussed: (1) configurational stability and optimization, (2) plasma transport and scaling laws, (3) heating, and (4) boundary effects. NSA

N75-13645# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OBTAINING FLOWS OF ENERGY IONS FROM A DISCHARGE WITH A HIGH TEMPERATURE OF ELECTRONS IN A HETEROGENEOUS MAGNETIC FIELD
R. A. Demirkanov and Yu. V. Kursanov 24 Jul. 1974 14 p refs Transl. into ENGLISH from the book "Plazmennye Uskoriteli" USSR, 1973 p 99-104
(FTD Proj. T74-04-03)
(AD-784247; FTD-MT-24-1056-74) Avail: NTIS CSCL 20/9

It is confirmed that the use of a magnetic field, heterogenous along the axis of discharge, makes it possible to support an electric field in the space of the plasma which is not connected with the influence of the electrodes. The results of theoretical calculations on the acceleration of electron-hot plasma along a magnetic field with a negative gradient support the prospect for obtaining continuous or quasi-continuous ion flows, the energies of which are greater than one kiloelectronvolt. A.A.D.

N75-13646# Naval Research Lab., Washington, D.C.
FILTER AND FILM METHOD OF MEASURING THE TEMPERATURE OF A HOT, DENSE, LOW-Z PLASMA FROM ITS QUANTUM BREMSSTRAHLUNG Final Report
Kent A. Gerber and B. Grant Logan 23 Jul. 1974 23 p refs
(NRL Proj. H02-28B; RR01109)
(AD-785842; NRL-7775) Avail: NTIS CSCL 20/9

Results of calculations of the total integrated X-ray quantum bremsstrahlung emission transmitted through absorbers of aluminum, copper and carbon (polyethylene) are presented for a range of plasma temperatures and absorber thickness for both ideal detectors and for film. Such information is useful in obtaining values for the electron temperature in a plasma from measurements of the X-ray continuum emission. Author (GRA)

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N75-13647 Rensselaer Polytechnic Inst., Troy, N.Y.
DESIGN CONSIDERATIONS FOR THE USE OF SUPERCONDUCTING TIN FILMS IN THE DETECTION OF RADIANT ENERGY Ph.D. Thesis
Roger Martin Katz 1974 175 p
Avail: Univ. Microfilms Order No. 74-26080

Design considerations for the use of high sheet resistance superconducting tin films as radiation detectors have been investigated. Such films are known to exhibit two modes of detection - a thermal (bolometer) and a current (nonlinear detection) mode. Emphasis has been placed on the interactions between the two detection modes. It is shown that a design which optimizes either mode by itself limits the performance of the other mode. High sheet resistance films are characterized by large temperature shifts in the superconducting transition with current. These shifts restrict bolometer performance by placing a limit on the range of bias currents that can be used. The perfomance of the bolometer mode can be improved, however, by thermally decoupling the film from its environment. Dissert. Abstr.

N75-13648 Princeton Univ., N.J.
ELECTRON TRAPPING IN ION IMPLANTED SILICON DIOXIDE FILMS ON SILICON Ph.D. Thesis
Noble Marshall Johnson 1974 83 p
Avail: Univ. Microfilms Order No. 74-25956

Photoelectric and MOS capacitance voltage techniques were used to investigate the properties of electron traps created in SiO2 films by ion implantation. The samples consisted of MOS structures with either Al or Ne ions shallowly implanted into the oxide layer. For comparison, unimplanted control samplers were also examined. Both Al-implanted and Ne-implanted SiO2 films possessed larger concentrations of electron traps than were found in undoped material. The trapping centers introduced by ion implantation are acceptor-like in that they acquire negative charge after capturing an electron, thereby giving rise to positive flatband voltages. From the existance of electron traps in Ne-implanted oxides it was concluded that the traps are associated with displacement damage created by ion implantation. Dissert. Abstr.

N75-13649 California Inst. of Tech., Pasadena.
AN EXPERIMENTAL INVESTIGATION OF VERY LOW FREQUENCY SEMICONDUCTOR NOISE Ph.D. Thesis
Robert Alexander Dukelow 1974 309 p
Avail: Univ. Microfilms Order No. 74-21592

An attempt was made to characterize more accurately the statistics of the very low frequency noise of a particular semiconductor device (a grounded input bipolar integrated operational amplifier) than was previously achieved. Power spectral density estimates are obtained for frequencies ranging from 250 Hz to 10 to the -7th power Hz. These estimates are based on data recorded over an uninterrupted period of approximately 1 year (355.9 days). Relatively high sample rates are maintained for each source, allowing a high degree of accuracy in these estimates without resorting to the questionable process of averaging the estimates for a number of noise sources. The high sample rate also allows for a reduction in the errors due to aliasing by the use of digital filtering techniques. Spectral density estimates for six separate noise sources are presented. Dissert. Abstr.

N75-13650 Arizona State Univ., Tempe.
RELIABILITY WITH ERROR DETECTING AND CORRECTING CODES IN SEMICONDUCTOR MEMORIES Ph.D. Thesis
Randall Charles Cork 1974 159 p
Avail: Univ. Microfilms Order No. 74-25799

Error-detecting-and-error-correcting codes are now commonplace in memory subsystems. The implementation of semi-conductor technology in such subsystems makes it possible to consider the redundancy of the code together with the inherent modularity of the system in the development of practical reliability models. Such considerations are undertaken in this work with the development of techniques enabling the incorporation of both data redundancy and hardware redundancy into a single reliability expression for a semiconductor memory subsystem. After memory subsystem organization is described in the context of b-adjacent codes, a generalized development of performance probabilities for any b-adjacent code is presented. A basic reliability model for code implementations is presented, followed by a modification of that model to accommodate the effects of intermittent memory failures. Dissert. Abstr.

N75-13651 Texas Univ., Austin.
NINETY DEGREE RUBY LASER LIGHT SCATTERING FROM A DEUTERIUM DENSE PLASMA FOCUS DEVICE Ph.D. Thesis
David James Temple Mayhall 1974 345 p
Avail: Univ. Microfilms Order No. 74-24901

A 90 ruby laser scattering experiment is reported. The scattering geometry, laser, laser beam input and output systems, scattered light observation system, polychromator with its fiber optics input-output system, detection photomultipliers and oscilloscopes, triggering sequence for firing the capacitor bank and the laser, and laser power monitor system are described. The experimental procedure used to obtain laser scattering signals

for 19kV capacitor bank voltage and 1.1 Torr D2 filling pressure with a stabilizing axial magnetic field of 54-195 gauss is outlined. Scattered signals obtained from 249-967 nsec after the onset of the neutron emission and estimates of the corresponding electron density are discussed. A linear decrease of average electron density with increasing magnetic field for focusing and non-focusing discharges was noted. Dissert. Abstr.

N75-13652 California Inst. of Tech., Pasadena.
PROTON-IMPLANTED OPTICAL WAVEGUIDES AND INTEGRATED OPTICAL DETECTORS IN GALLIUM ARSENIDE Ph.D. Thesis
Harold McDowell Stoll 1974 196 p
Avail: Univ. Microfilms Order No. 74-24454

Free carrier compensation and additional near band-edge optical attenuation are caused by defect associated energy levels which appear within the forbidden energy gap of proton-irradiated gallium arsenide. These damage induced changes are exploited in the fabrication of passive optical waveguides and waveguide compatible detectors. A model was constructed which explains the experimentally observed electrical and optical properties of proton-irradiated gallium arsenide. The optical confinement and attenuation properties of waveguides formed by irradiating n-type gallium arsenide with 300 keV protons were analyzed. Optical confinement is found to be caused by the plasma depression effect. Optical attenuation is due to a combination of dissipative scattering and absorption by thermal spikes and dipole-assisted transitions between defect levels and the band continue. The model is used to make a preliminary analysis of an integrated optical detector fabricated from the same proton-irradiation technique. Dissert. Abstr.

N75-13653 Rensselaer Polytechnic Inst., Troy, N.Y.
ELECTROMAGNETIC RADIATION DETECTION BY GRANULAR THIN FILM SUPERCONDUCTORS Ph.D. Thesis
Warren Joseph Ayer, Jr. 1974 207 p
Avail: Univ. Microfilms Order No. 74-26062

Granular thin film superconductors were shown to possess two types of electromagnetic radiation detection mechanisms. One was a thermal or bolometer mechanism, while the other was non-thermal and has been termed the current mode. To study these mechanisms, tin thin films were fabricated by room temperature evaporation onto a glass substrate pre-seeded with a discontinuous 40 A gold layer. These films were then mounted both in vacuum and directly in helium. In vacuum the thermal conductance to the helium reservoir was adjusted to give medium speed bolometer operation. This caused the thermal and non-thermal responses to be of nearly equal magnitude, while still being separable experimentally. The thermal response was shown to be nearly independent of wavelength; the current mode, on the other band, was shown to arise from the interaction of Josephson-like processes with the incident electromagnetic fields. Dissert. Abstr.

N75-13654 Rensselaer Polytechnic Inst., Troy, N.Y.
IMPROVED MATERIALS FOR HIGH FREQUENCY FIELD EFFECT TRANSISTORS Ph.D. Thesis
Bantval Jayant Baliga 1974 156 p
Avail: Univ. Microfilms Order No. 74-26063

The growth and characterization of improved semiconductor materials for microwave field effect transistors are described. Vapor phase epitaxial growth of GaAs, InAs and GaInAs alloys was accomplished using trimethylgallium (TMG), triethylindium (TEI) and arsine. It was found that this technique can be used for the growth of alloys over the entire composition range. Growth of AnAs was mass transport limited over a temperature range of 650 C to 575 C and kinetically controlled below this temperature. The best films were obtained at 600 C. Good control over growth rate was achieved by varying the concentration of the reactants. Growth rates up to 0.14 microns/min were achieved, with typical values of 0.05 to 0.07 microns/min. The carrier concentration in the layers was found to decrease inversely with thickness, in agreement with a new theory developed using point defects. Thin layers had mobilities of one third of the bulk mobility of InAs, and compared well with the mobilities in layers grown by other techniques. Dissert. Abstr.

N75-13655 Kansas State Univ., Manhattan.
X-RAY INDUCED CURRENTS AND SPACE-CHARGE BUILDUP IN MOS CAPACITORS Ph.D. Thesis
John William Farmer 1974 109 p
Avail: Univ. Microfilms Order No. 74-25599

The primary effect of ionizing radiation on the MOS structure is the buildup of positive space charge in the oxide layer. The purpose of this work was to study the results of the currents induced during X-irradiation in relation to the process of space charge buildup. The MOS structures used in the present study were made from thermally oxidized Si wafers with either Al or Au vapor deposited electrodes. Current versus time measurements, indicate that after sufficient space charge buildup, injection of charge from the electrodes becomes significant. Current versus time measurements also indicate that space charge builds up more rapidly when Si is the cathode than when the metal electrode is the cathode. Dissert. Abstr.

N75-13656 University of Southern Calif., Los Angeles.
TEMPERATURE DEPENDENCE OF THE PHONONS IN BaTiO3 AND SOME EFFECTS OF THE EXCITON ON THE RAMAN SCATTERING OF Cu2O AND CdS Ph.D. Thesis
Artemio Scalabrin 1974 115 p
Avail: Univ. Microfilms Order No. 74-26049

Measurements of all the phonon modes of BaTiO3 are reported in the temperature range 10-130 C where ferroelectric BaTiO, is in the tetragonal phase. The dielectric constant is calculated and compared with this microwave measurement. It is shown that there is no soft optic mode connected with the ferroelectric-paraelectric phase transition in BaTiO3. Two effects of excitons in the Raman cross section are studied in Cu2O and in CdS. In Cu2O the resonant enhancement of the 220cm 1 Raman line due to the 1s yellow exciton is investigated. In CdS a model is proposed to explain the cancellation effect in the Raman cross section by assuming an interference between the sharp exciton states and the broad electronic band states. Dissert. Abstr.

N75-13657 Saint Louis Univ., Mo.
ELECTRICAL PROPERTIES OF IRRADIATED GaSb Ph.D. Thesis
Danny Hale Sokolowski 1974 128 p
Avail: Univ. Microfilms Order No. 74-24145

Single crystals of undoped gallium antimonide were irradiated with 3.2 MeV deuterons. Resistivity, Hall coefficient, and the Seebeck coefficient were measured as functions of temperature and deuteron flux. Radiation induced effects were observed in resistivity and Hall coefficients for fluxes ranging from 10 to the 14th power/sq cm. Significant changes in the Seebeck coefficient were observed only for fluxes of approximately 10 to the 16th power/sq cm. Resistivity and Hall coefficient were used to determine the Hall mobility. The data was best fit assuming scattering by ionized impurities and acoustical phonons. Data presented is interpreted assuming that the reciprocal mobility has a temperature dependence. Dissert. Abstr.

N75-13658 Case Western Reserve Univ., Cleveland, Ohio.
ELECTRON PARAMAGNETIC RESONANCE OF RARE-EARTH IONS IN RARE-EARTH-GROUP VA INTERMETALLIC COMPOUNDS Ph.D. Thesis
Kazushi Sugawara 1974 204 p
Avail: Univ. Microfilms Order No. 74-25684

Electron paramagnetic resonance (EPR) is used to study the magnetic properties of the rare earth group 5a intermetallic compounds (powder) with a crystal field singlet ground state. The EPR of the excited level of TmP and PrP have been observed. The EPR of the excited gamma 5(+) level of Tm3+ in TmP has revealed an anomalous g-value near the temperatures where the intensity of the EPR absorption is maximum. The EPR of the excited level of Pr+ in PrP has been observed in the temperature range between 270 K and 500 K. The EPR of Gd3+ ions diluted in the rare earth group 5a intermetallic compounds have shown that the G-shift of the Gd3+ ion is proportional to the isothermal susceptibility of the host material, while the line width is proportional to the difference between the isothermal and isolated susceptibilities of the host material. Dissert. Abstr.

N75-13659 Georgetown Univ., Washington, D.C.
A THEORETICAL INTERPRETATION OF GAP ANISOTROPY IN SUPERCONDUCTING Ga Ph.D. Thesis
Irene Chiou Wu 1974 147 p
Avail: Univ. Microfilms Order No. 74-25697

The striking anisotropy in the superconducting energy gap of single crystal gallium recently reported by Gregory et al., is interpreted in terms of the Markowitz and Kadanoff anisotropy function. It is shown that multiple gaps are a result of the electronic degeneracy being split at the zone boundaries. In addition, a complementary approach to the anisotropy is carried out via the Bogoliubov-de Gennes equations for inhomogeneous superconductors. They are solved in the NFE-two plane wave approximation. Just as in a normal metal, the ratio of the NFE amplitudes of the two plane waves is + or - 1 at the zone boundaries. This is reflected in the density of states which suggests a two gap model contributing equally to the current.

Dissert. Abstr.

N75-13660 Louisiana State Univ., Baton Rouge.
ELECTRONIC AND OPTICAL PROPERTIES OF LITHIUM Ph.D. Thesis
Wai-Yim Ching 1974 199 p
Avail: Univ. Microfilms Order No. 74-24764

The electronic and optical properties of b.c.c. lithium were investigated using energy band theory. A self-consistent calculation of energy bands was performed using the LCAO method. The basis set consisted of nine s-type, six p-type, and three d-type Gaussian orbitals. Exchange was included according to the X alpha method with alpha = 2/3. Results are presented for the band structure, Fermi surface properties, cohesive energy and Compton profile. The distortions of the Fermi surface from free electron sphere are less than 4%. The optical and thermal effective mass ratios are 1.48 and 1.53 respectively. The calculated cohesive energy is 0.124 Ry. The interband contribution to the optical conductivity was calculated including the k-variation of the momentum matrix elements up to 10 eV. The onset of direct interband transition is predicted to occur at 3.28 eV.

Dissert. Abstr.

N75-13661 California Inst. of Tech., Pasadena.
TEMPERATURE DEPENDENCE OF SINGLE CRYSTAL SPINEL (MgAl2O4) ELASTIC CONSTANTS FROM 293K TO 423K MEASURED BY LIGHT-SOUND SCATTERING IN THE RAMAN-NATH REGION, PART 1. EFFECT OF ANELASTICITY ON PERIODS OF EARTH'S FREE OSCILLATION (TOROIDAL MODES), PART 2 Ph.D. Thesis
Hsi-Ping Liu 1974 181 p
Avail: Univ. Microfilms Order No. 74-24449

The temperature dependence of single crystal elastic constants of synthetic stoichiometric MgAl2O4 spinel has been measured by the light-sound scattering technique in the Raman-Nath region. The crystal is set into forced vibration and a He-Ne laser beam is diffracted by the stress induced birefringence inside the crystal. The sound wavelength inside the crystal is inferred from the laser diffraction angle. Combining the sound wavelength with the measured transducer driving frequency, the velocity inside the crystal is determined. Calculations based on currently accepted elastic and anelastic models for the Earth show that the shift in period due to anelasticity is at most 0.023 percent for the toroidal modes. Dissert. Abstr.

N75-13662 Rensselaer Polytechnic Inst., Troy, N.Y.
A THEORETICAL CALCULATION OF THE ANISOTROPY IN CONDUCTIVITY OF ZINC SINGLE CRYSTAL IN HIGH TEMPERATURE REGION Ph.D. Thesis
Wai-Ching Chan 1974 132 p
Avail: Univ. Microfilms Order No. 74-26066

An iteration method for solving the Boltzmann equation for the electron relaxation time tensor was introduced. The calculation for the metal zinc at high temperature was carried through in detail numerically for both one-plane wave and multiple-plane waves approximations. The latter calculation shows a nonzero relaxation time right at the Brillouin Zone section of the Fermi surface. The second order correction in solving the Boltzmann equation was evaluated and it turns out to be very small. Zinc exhibits considerable elastic anisotropy with acoustic velocities higher for the modes polarized in the basal plane. As a consequence, the electron scattering is smaller for the Umklapp processes parallel to this plane and the relaxation time is correspondingly longer for conduction perpendicular to the c-axis. On the other hand, the Fermi sphere, which is cut by many Brillouin Zones at large angles to the basal plane, has more distortions closer to the basal plane than to the c-axis.

Dissert. Abstr.

N75-13663 Montana State Univ., Missoula.
JUNCTION ANALYSIS AND TEMPERATURE EFFECTS IN SEMICONDUCTOR HETEROJUNCTIONS Ph.D. Thesis
Naresh Tandan 1974 150 p
Avail: Univ. Microfilms Order No. 74-18305

A new classification for semiconductor heterojunctions was formulated by considering the different mutual positions of conduction-band and valence-band edges. To the nine different classes of semiconductor heterojunction thus obtained, effects of different work functions, different effective masses of carriers and types of semiconductors are incorporated in the classification. General expressions for the built-in voltages in thermal equilibrium were obtained considering only nondegenerate semiconductors. Built-in voltage at the heterojunction is analyzed. The approximate distribution of carriers near the boundary plane of an abrupt n-p heterojunction in equilibrium is plotted. In the case of a p-n heterojunction, considering diffusion of impurities from one semiconductor to the other, a practical model is proposed and analyzed. The effect of temperature on built-in voltage leads to the conclusion that built-in voltage in a heterojunction can change its sign, in some cases twice, with the choice of an appropriate doping level. Dissert. Abstr.

N75-13664 Colorado State Univ., Fort Collins.
PLASMA EMISSION SPECTROMETRY ANALYSIS Ph.D. Thesis
Frederick Ervin Lichte 1973 107 p
Avail: Univ. Microfilms Order No. 74-17539

The development of a low power microwave (2450Mhz) induced argon plasma as an excitation source for emission spectrochemical analysis is described. The radio frequency (30Mhz) plasma and the microwave system are compared in terms of plasma propagation mechanisms, electron energetics, coupling, and operational features. A reduction-vaporization method to obtain volatile elemental mercury and the conversion of arsenic into arsine gas through the use of an arsine generator are presented. A modification of the microwave resonant cavity and the use of a desolvation system allowed the direct analysis of solutions. A method for the emission spectrometric determination of lithium isotope concentrations is developed. The microwave induced argon plasma has demonstrated increasing analytical applicability. The methods described extend the applicability and provide a means for solving difficult analysis problems.

Dissert. Abstr.

N75-13665# Polish Academy of Sciences, Warsaw.
APPLICATION OF STOCHASTIC METHODS IN THE DETERMINATION OF TRANSPORT COEFFICIENTS IN PLASMA [METODY STOCHASTYCZNE W ZASTOSOWANIU DO WYZNACZANIA WSPOLCZYNNIKOW TRANSPORTU W PLAZMIE]
Krzysztof Zuchowski 3 Apr. 1973 26 p refs In POLISH (Rept-93; Rept-18/1973) Avail: NTIS HC $3.75

A method for determining the electrical conductivity, the diffusion coefficient, and the thermal conductivity coefficient in plasmas is discussed. The method is based on a modification of the generalized stochastic Langevin equation for Brownian motion in the case when the friction coefficient depends on the velocity. The Fourier transformations of the components of the electrical conductivity tensor were obtained by using the first and second fluctuation-dissipation theorem. The transforms of the friction tensor coefficient components are compared with the transforms of the autocorrelation function for the intensity of the electrical field. Author

N75-13666# Sandia Labs., Albuquerque, N.Mex.
TRANSPORT PROPERTIES OF SMALL-POLARONS
D. Emin 1974 16 p refs Presented at the Intern. Symp. on Electron. Properties of Oxides and Sci. Appl., West Lafayette, Indiana, 29 May 1974 Sponsored by AEC

(SLA-74-5016; Conf-740541-1) Avail: NTIS HC $3.25

A qualitative discussion of the essentials of small-polaron motion is presented. A very brief description is given of a small-polaron and the situation under which it is formed, and the principal physical features and predictions of the theory of small-polaron transport are addressed. Quantum-mechanical treatments of small-polaron hopping motion are considered, along with the semiclassical approach to the calculation of the high temperatures adiabatic and nonadiabatic jump rate. The high-frequency absorption associated with small-polaron motion is also discussed. A review of the Hall-mobility calculations and some comments about the thermoelectric power are presented. Author

N75-13667# Cornell Univ., Ithaca, N.Yj Lab. of Atomic and Solid State Physics.

WEAK COUPLING THEORY OF PARAELECTRIC ABSORPTION SPECTRA

R. Pirc and B. G. Dick (Utah Univ.) Apr. 1974 30 p refs Sponsored by AEC

(COO-3161-22) Avail: NTIS HC $3.75

Phonon effects in paraelectric impurity resonance and relaxation spectra are investigated for the weak coupling case by means of the Green's function decoupling method. Numerical results for the spectra in a wide frequency range are shown to be in agreement with the phenomenological theory based on dipole lattice relaxation rates involving one-phonon induced tunneling processes. In the presence of an external bias field the spectrum contains a low frequency maximum associated with a Debye-type longitudinal relaxation. The phonon induced tunneling mechanism is also responsible for the broadening of the resonance line in the absence of inhomogeneous strains and electric fields in the crystal. Author

N75-13668# Oak Ridge Y-12 Plant, Tenn.

DETERMINATION OF LATTICE PARAMETERS BY A SEARCH-SCAN COMPUTER-ASSISTED DATA ANALYSIS METHOD

W. E. Baucum, D. A. Carpenter, L. E. Bearden, Jr., and K. A. Sells Jul. 1974 18 p refs

(Contract W-7405-eng-26)

(Y-1946) Avail: NTIS HC $3.25

A method was developed for determining lattice parameters, using a search-scan technique with computer-assisted data analysis. This method consists of collecting X-ray diffraction data using a search-scan technique which provides useful data in a digital output format and uses a PDP-15 computer to smooth the data, separate the K alpha 1 from the K alpha 2 X-ray peaks, and find peak locations by fitting a parabola to the top 20% of the separated K alpha 1 peak. Lattice parameters are then calculated by a least squares refinement procedure. This method has reduced operator time and increased analysis precision. Data are given for titanium and niobium carbides. Author (NSA)

N75-13669# Sandia Labs., Albuquerque, N.Mex.

BIBLIOGRAPHY: SANDIA LABORATORY HYBRID MICROCIRCUIT AND RELATED THIN FILM TECHNOLOGY

C. M. Tapp and R. K. Traeger Jun. 1974 40 p refs

(Contract AT(29-1)-789)

(SAND-74-0009) Avail: NTIS HC $3.75

Sandia originated documents describing aspects of technology development related to hybrid microcircuits and thin films for nuclear weapon applications are summarized. Authors, titles, and abstracts are given for each unclassified document. The papers are categorized according to the various technologies involved in hybrid microcircuit production. Author (NSA)

N75-13670# Science Research Council, Chilton (England).

DESIGN STUDY FOR BEAM LINE DIPOLES (SUPERCONDUCTING)

A. D. McInturff Apr. 1974 31 p refs

(RL-74-052) Avail: AEC Depository Libraries HC $4.75

The design study was undertaken to find the simplest efficient iron shielded conductor configuration which would serve as a 6.0 Tesla 10 cm aperture beam line dipole element. The design calculations are done with the on line design program GFUN at the Rutherford Laboratory. Magnet design options and limits of acceptable performances are stated, and designs that were considered are summarized, with discussion and conclusions. NSA

N75-13671# Stanford Univ., Calif. Center for Materials Research.

MATERIALS RESEARCH AT STANFORD UNIVERSITY Annual Report, 1 Jul. 1973 - 30 Jun. 1974

Aug. 1974 375 p refs

(AD-785446; CMR-74-9; AR-13) Avail: NTIS CSCL 20/12

The Thirteenth Annual Report includes information briefly describing the total research activity related to the science of materials at Stanford University during the period July 1, 1973, through June 30, 1974. Various individual research programs are arranged alphabetically by the name of the principal investigator. Also included are lists of publications, doctoral dissertations, faculty and senior staff members, research associates, graduate students and degrees awarded. Finally, a name index is included for convenience in locating references to the activities of specific individuals. GRA

N75-13672# Battelle Columbus Labs., Ohio.

ELECTRONIC PROPERTIES OF NARROW-BAND COMPOUNDS Final Report

Richard P. Kenan and Paul R. Sievert 16 May 1974 18 p refs

(Grant AF-AFOSR-2023-71; AF Proj. 9763)

(AD-782056; AFOSR-74-1138TR) Avail: NTIS

A summary of research on the calculation of the band structure of narrow-band compounds is given. Approaches taken and difficulties encountered are described. (Modified author abstract) GRA

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N75-13673# Los Alamos Scientific Lab., N.Mex.

FREE ENERGY IN CONCENTRATION SPACE

C. J. Everett Jul. 1974 8 p ref

(Contract W-7405-eng-36)

(LA-5653-MS) Avail: NTIS HC $3.25

The free energy of a system of perfect gases, undergoing a reversible reaction governed by the law of mass action, is studied as a function on the trajectory of the system in a space of concentrations. It is shown that the fundamental law of chemical thermodynamics delta holds (1) if the Gibbs free energy is minimal at equilibrium on the path of a system reacting at constant pressure, and (2) if the Helmholtz free energy is minimal at equilibrium on the path of a system reacting at constant volume. Author

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N75-13674*# Washington Univ., St. Louis, Mo. Communications Group.

TELECOMMUNICATIONS MEDIA FOR THE DELIVERY OF EDUCATIONAL PROGRAMMING

Richard Ballard and Lester F. Eastwood, Jr. Nov. 1974 143 p refs

(Grants NGR-26-008-054; NSF EC-38871)

(NASA-CR-140880; Memo-74/1) Avail: NTIS HC $5.75 CSCL 17B

The technical characteristics of various telecommunications media are examined for incorporation into educational networks. FM radio, AM radio, and VHF and UHF television are considered

along with computer-aided instruction. The application of iteration networks to library systems, and microform technology are discussed. The basic principles of the communications theory are outlined, and the operation of the PLATO 4 random access system is described. F.O.S.

N75-13761* Santa Clara Univ., Calif.
APPROACHES FOR TEACHING PLANETOLOGY
Ronald Greeley *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 499-500 (For availability see N75-13730 04-91)
CSCL 05B

N75-13768* Massachusetts Univ., Amherst.
USE OF LUNAR ORBITER PHOTOGRAPHS IN EARTH SCIENCE COURSES
George E. McGill and Paul A. Chizook *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 569-574 refs Repr. from J. Geol. Educ., v. 19, no. 1, Jan. 1971 (For availability see N75-13730 04-91)
(Grant NGR-22-010-052)
CSCL 05B

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N75-13675# Bendix Corp., Kansas City, Mo.
WORKING-IN-PROCESS INVENTORY CONTROL
M. J. Kepner May 1974 25 p refs Presented at the Inventory Control Seminar, Teterboro, N. J., 21 May 1974
(Contract AT(29-1)-613)
(BDX-613-1145; Conf-740542-1) Avail: NTIS HC $3.25

The efficient scheduling of important and costly productive resources, including machines, material, tooling, and personnel, is essential if schedules are to be met and costs are to be controlled. A comprehensive production control and inventory management system is described that includes these vital capabilities. The work-in-process portion of the total system provides the basic information necessary to achieve a high degree of control over shop scheduling and the allocation of productive resources. Important benefits include a reduction in the number of production control and manufacturing personnel, a significant reduction in overtime utilization, an improved schedule performance, and the elimination of an annual plant shutdown for physical inventory. Author

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N75-13676* National Aeronautics and Space Administration, Washington, D.C.
NASA PUBLICATIONS MANUAL 1974
1974 57 p refs
(NASA-SP-7013) Avail: SOD HC $1.15 CSCL 05B

The various types of NASA publications are described, including formal series, contributions to external publications, informal papers, and supplementary report material. The physical appearance and reproduction procedures for the format of the NASA formal series are discussed, and samples are provided. Matters relating to organization, content, and general style are also considered. J.A.M.

N75-13677*+ National Aeronautics and Space Administration, Washington, D.C.
NASA PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY. SECTION 1: ABSTRACTS
Jul. 1974 98 p refs
(NASA-SP-7039(05)) Avail: NTIS HC $3.00 CSCL 05B

This bibliography is issued in two sections: Section 1 - Abstracts, and Section 2 - Indexes. The abstract section cites 217 patents and applications for patent introduced into the NASA scientific and technical information system during the period of January 1974 through June 1974. Each entry consists of a citation, an abstract, and, in most cases, a key illustration selected from the patent or application for patent. The index section contains entries for 2653 patent and application for patent citations covering the period May 1969 through June 1974. The index section contains five indexes -- subject, inventor, source, number and accession number. Author

N75-13678*+ National Aeronautics and Space Administration, Washington, D.C.
NASA PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY. SECTION 2: INDEXES
Jul. 1974 460 p refs
(NASA-SP-7039(05)) Avail: NTIS HC $5.00
For abstract, see N75-13677.

N75-13679*# Kanner (Leo) Associates, Redwood City, Calif.
REPORT ON THE CONSOLIDATION OF THE NATIONAL INFORMATION SYSTEM FOR SCIENCE AND TECHNOLOGY
Washington NASA Dec. 1974 71 p Transl. into ENGLISH from the Japanese report
(Contract NASw-2481)
(NASA-TT-F-16027) Avail: NTIS HC $4.25 CSCL 05B

The National Information System for Science and Technology (NIST), organized into an integrated center and subcenters, will take over the role of processing information from specialized fields and organizing retrieval and utilization programs. The subcenters -- specialized centers, data centers, regional service centers, clearing organizations, a central depository and others -- will be consolidated from existent organizations such as scientific societies and associations and industrial testing and research groups. The national government will take the lead in this consolidation, relying on the private sector for aid in their specialized fields. Author

N75-13443* Linguistic Systems, Inc., Cambridge, Mass.
ERROR IN INTERPOLATION AND CHOICE OF THE RANGE OF DISCRETENESS IN MEASUREMENTS IN A HYDROPHYSICAL FIELD
O. F. Zudin and B. A. Nelepo *In its* Automation of the Collection and Analysis of Sci. Inform. in the Probl. of the Interaction of the Atmosphere and Ocean (NASA-TT-F-801) Nov. 1974 p 71-79 refs Transl. into ENGLISH from the book "Avtomatizatsiya Sbora i Analiz Nauchnoy Informatsii v Probleme Vzaimodeystviya Atmosfery i Okeana" Leningrad, Hydrometeorol. Press, 1972 p 59-64 (For availability see N75-13438 04-46)
CSCL 05B

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N75-13680# Committee on Appropriations (U. S. Senate).
DEPARTMENT OF DEFENSE APPROPRIATIONS FOR FISCAL YEAR 1975. PART 1: DEPARTMENT OF DEFENSE, DEFENSE AGENCIES, PUBLIC WITNESSES
Washington GPO 1974 1294 p refs Hearings before Subcomm. of the Comm. on Appropriations, 93d Congr., 2d Sess., 5 Mar. 1974
(GPO-32-382) Avail: Comm. on Appropriations

The level of military strength appropriate to maintain adequate defense preparedness and to present a balanced posture during detente was debated in a Congressional hearing whose purpose was to appropriate funds to DOD for fiscal year (FY) 1975. Comparisons are made between the FY 1974 budget and the FY 1975 budget request, and full breakdowns of budget figures

for the numerous agencies within DOD are provided. The SALT agreement and the ABM treaty with the U.S.S.R. are considered in the debate. A.A.D.

N75-13681# Committee on Appropriations (U. S. Senate).
DEPARTMENT OF DEFENSE APPROPRIATIONS FOR FISCAL YEAR 1975. PART 3: DEPARTMENT OF THE NAVY
Washington GPO 1974 1082 p refs Hearings before Subcomm. of the Comm. on Appropriations, 93d Congr., 2d Sess., 13 Mar. 1974
(GPO-32-383) Avail: Comm. on Appropriations

Special budget issues related specifically to operations of the Department of the Navy were considered during the formulation by Congress of an overall DOD budget appropriation for FY 1975. Operation and maintenance of present ship, aircraft, and submarine fleets, as well as shipbuilding and conversion programs were the focus of the debate. Military and civilian personnel issues and manpower requirements are also considered. Research and development programs aimed at modification of existing Navy aircraft, and improvement of aircraft support equipment and facilities are described insofar as their appropriateness for adequate budget support in FY 1975. A.A.D.

N75-13682# National Science Foundation, Washington, D.C.
AN ANALYSIS OF FEDERAL R AND D FUNDING BY FUNCTION, FISCAL YEARS 1969 - 1975
Aug. 1974 79 p
(NSF-74-313) Avail: SOD HC $2.25

Federal support of research and development programs in terms of selected national purposes or functions is measured. Relative research and development priorities are shown by using a system in which each program is assigned to only one function, with no overlapping, and using at the same time a function list that covers all leading national interests to which research and development activities are applicable. Author

N75-13683# Bari Univ. (Italy).
DETAILED ECONOMIC MODELS OF INDUSTRIAL AND OTHER ACTIVITIES
Giorgio Nebbia 25 Oct. 1974 27 p refs Presented at WHO Regional Office for Europe Working Group on Regional Residuals, Environ. Quality Management Models, Rotterdam, 22-25 Oct. 1974
Avail: NTIS HC $3.75

The indicators of environmental deterioration caused by human activities (agricultural, industrial, urban) as sources of chemicals and energy that are disposed in natural receiving bodies are considered. The human activites generate residuals and wastes that are discharged, without paying any price, in the environmental receiving bodies, such as the air, rivers, soil, sea, etc. The main relations between human activities and the environment are represented in a flow chart configuration, and it is maintained that the environment can be defended with political and economic actions directed to decrease the exploitation of natural resources, to decrease the emission of wastes in the biosphere, and to increase the treatment and recycling of residuals. Environmental flow factors are analyzed by the input/output method employed in economic theory, and the concept of economic-ecologic accountancy is introduced. A.A.D.

N75-13684# Sandia Labs., Albuquerque, N.Mex.
BALANCING RELIABILITY, COST, AND HARDNESS
J. A. Hood Jul. 1974 22 p Presented at the Ann. Conf. on Nucl. and Space Radiation Effects, Fort Collins, Colo., 15 Jul. 1974 Sponsored by AEC
(SAND-74-5209; Conf-740707-9) Avail: NTIS HC $3.25

Balancing the cost and quality of piece parts (such as semiconductor devices) was studied. Data are given for the procurement of semiconductor devices. NSA

N75-13685# International Research and Technology Corp., Washington, D.C.
TIRE RECYCLING AND REUSE INCENTIVES
Charles C. Humpstone, Edward Ayres, Sam G. Keahey, and Theodore Schell 1974 116 p refs
(Contract CPE-R-70-0047)
(PB-234602/1; EPA-SW-530-32C) Avail: NTIS HC$5.25 CSCL 13B

The report describes a series of strategies to deal with the disposal/recovery of scrap tires. These tires form a particularly intractable form of solid waste since they do not decompose, have an adverse effect on incinerators and air emissions, and disrupt the compaction process in sanitary landfills. The options for the disposal or recovery of used tires are described by this study as well as research into new methods of tire recovery. Rubber reclaimed from scrap tires can be used in new tire manufacture but lacks the uniformity, tensile strength, heat resistance and abrasion resistance to be used in very large concentrations. Pyrolysis, hydrogenization and related processes for separating tires into substances that may be recycled into tire production or sold as fuel, although workable on a laboratory scale, have not yet been proven commercially. The incorporation of chopped tires into an interface layer of asphalt between a deteriorated road and its new surfacing is a promising use of tires. A series of strategies was devised under which various economic, regulatory, educational, and research and development activities were combined to provide incentives to encourage the reuse of tires or improve tire disposal practices. GRA

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N75-13686*# Kanner (Leo) Associates, Redwood City, Calif.
SPACE, COOPERATION, LAW
V. S. Vereshchetin Washington NASA Nov. 1974 142 p refs Transl. into ENGLISH of the book "Kosmos. Sotrudnichestvo. Pravo" Moscow, Nauka Press, 1974 167 p
(Contract NASw-2481)
(NASA-TT-F-16016) Avail: NTIS HC $5.75 CSCL 05D

A brief history of international cooperation in space by the Soviet Union, the role of law in development of cooperation, various aspects of the Interkosmos program, and the bilateral cooperation programs with the U.S.A., France and India are reviewed. Joint programs between the U.S.A. and western European countries and the organization and programs of ESRO and related organizations in western Europe are discussed. International programs of NASA, organization and activities of the UN Committee on Peaceful Uses of Space, COSPAR, and the International Federation of Astronautics are discussed. Information is presented on organization and activities of international communication satellite organizations, meteorological satellites and organizations, earth resources satellites, organizations and international agreements, and on the Soyuz-Apollo program. Texts of international agreements on space programs are presented. Author

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety*, *16 Space Transportation*, and *44 Energy Production and Conversion*.

N75-13687 Saint Louis Univ., Mo.
A DYNAMICAL STUDY OF TEMPORAL AND SPATIAL VARIATIONS IN THE HEIGHT OF A LOW-LEVEL INVERSION WITH APPLICATIONS TO A METROPOLITAN AREA Ph.D. Thesis
Dale Carroll Barnum 1974 111 p
Avail: Univ. Microfilms Order No. 74-24039

The importance of selected atmospheric properties and physical characteristics of the urban environment on the growth of the atmospheric mixing layer during daylight hours was investigated. The importance of including the horizontal advection of atmospheric properties as a necessary feature in

multi-dimensional circulation models of the urban atmosphere is demonstrated. An advective model is developed to diagnose and study selected key factors which impact on the growth and variability of the mixing depth. Interactions between these various parameters are summarized and discussed. Dissert. Abstr.

N75-13688 Princeton Univ., N.J.
A METHODOLOGICAL APPROACH TO MAN-ENVIRONMENT RELATIONS: SEMANTIC DIMENSIONAL STRUCTURES AND PREFERENCES AS A FUNCTION OF EXPERIENCE Ph.D. Thesis
Vimolsiddhi Horayangkura 1974 303 p
Avail: Univ. Microfilms Order No. 74-25953

The fundamental semantic dimensions underlying people's perceptions of the physical environment were studied. Both verbal and nonverbal techniques were applied. Dimensional structures and preferences were assessed across people with urban, nonurban and mixed backgrounds. The subjects participated in an experiment which involved sorting a set of environmental displays into as many groups as the subjects wanted, and rating each of these displays on a set of selected bi-polar scales. The sorting data (nonverbal) were analyzed by Kruskal's Multidimensional Scaling method and the rating data (verbal) by a factor-analytic technique. The congruence between the verbal and the nonverbal approaches was confirmed by multiple regression techniques, fitting the verbal properties as direction vectors in the multidimensional scaling configurations. The preference data revealed a consistent pattern of preferences which corresponded to the subjects' environmental backgrounds. The implications of the findings for further research, and for environmental planning and design are discussed. Dissert. Abstr.

N75-13689 Cornell Univ., Ithaca, N.Y.
PLANNING AND OPERATION OF URBAN WATER QUALITY MANAGEMENT SYSTEMS Ph.D. Thesis
Mohamed Mahmoud El-Sahragty 1974 176 p
Avail: Univ. Microfilms Order No. 74-24284

Improved methodology for defining and evaluating alternatives for managing urban water quality were studied. The study focuses on the planning and operation of the wastewater control systems. The metropolitan economic-engineering urban water quality system is defined. A system analysis approach, that accommodates the complex interactions among the physical, technological, social and economic aspects of the urban water management problem, is adopted. Mathematical modeling and programming techniques are utilized to define effective and economically efficient waste-water control programs. A linear programming model is utilized to define the minimum required investment in the wastewater control system and the optimal allocation of resources in the wastewater control system. To take into account the risk factor, a chance constrained formulation is provided. A scheme is proposed for analyzing a system characterized by uncertain input data base. Dissert. Abstr.

N75-13690*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TRANSPORTATION VEHICLE ENERGY INTENSITIES. A JOINT DOT/NASA REFERENCE PAPER
Alfred C. Mascy and Robert L. Paullin (DOT, Washington) Jun. 1974 29 p
(NASA-TM-X-62404; DOT-TST-13-74-1) Avail: NTIS HC $3.75 CSCL 13F

A compilation of data on the energy consumption of air and ground vehicles is presented. The ratio BTU/ASM, British Thermal Units/Available Seat Mile, is used to express vehicle energy intensiveness, and related to the energy consumed directly in producing seat-mile or ton-mile productivity. Data is presented on passenger and freight vehicles which are in current use or which are about to enter service, and advanced vehicles which may be operational in the 1980's and beyond. For the advanced vehicles, an estimate is given of the date of initial operational service, and the performance characteristics. Other key considerations in interpreting energy intensiveness for a given mode are discussed, such as: load factors, operations, overhead energy consumption, and energy investments in new structure and equipment. Author

N75-13691# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
THERMAL AND IMPACT TESTS RELATED TO SHIPPING CONTAINERS
J. W. Langhaar 1974 23 p refs Presented at 4th Intern. Symp. on Packaging and Transp. of Radioactive Mater., Miami Beach, Fla., 22 Sep. 1974 Sponsored by AEC
(DP-MS-74-44; Conf-740901-11) Avail: NTIS HC $3.25

Progress to date is described for four current test programs relating to Type B shipping containers: (1) impact and fire resistance of the Savannah River version of the LLD-1 container for shipping plutonium-239 buttons; (2) leak tightness of closures with several different gasket materials when subjected to high temperatures for times up to two hours; (3) impact tests of an inner container of about 15 cm diameter, intended to remain leaktight after special form tests; (4) impact tests of small scale models of a long slender container when dropped at small angles with the horizontal, and comparison with calculations based on rigid body dynamics. Author (NSA)

N75-13692# Sandia Labs., Albuquerque, N.Mex.
QUANTITATIVE CHARACTERIZATION OF THE ENVIRONMENT EXPERIENCED BY CARGO IN MOTOR CARRIER ACCIDENTS
J. T. Foley, W. F. Hartman, D. W. Larson, and R. K. Clarke [1974] 14 p refs Sponsored by AEC
(SLA-74-5371) Avail: NTIS HC $3.25

A study was performed to determine the severity of motor carrier accidents. The analysis is based upon accident rates reported for intercity shipments of property by Class 1 and 2 interstate motor carriers. NSA

N75-13693# Transportation Research Board, Washington, D.C.
COST-BENEFIT AND OTHER ECONOMICAL ANALYSES OF TRANSPORTATION
Donald H. Farness 1974 75 p
(PB-234403/4; TRB/TRR-74/490) Avail: NTIS HC $4.25 CSCL 13B

The papers examine various economic concerns that affect transportation systems: the papers explore the impact of tourism on the regional economy of Oregon; discuss the economic impact of the environmental impact statement; discuss a detailed highway user economic analysis of field-inventoried section data combined with an investment level analysis and the associated computerized models; examine the application of traditional benefit-cost analysis, frequently used to evaluate construction projects, as a means to analyze nonconstruction activities of highway agencies for the purposes of improving resource allocation within and between programs; present data concerning operating costs of bus and rail systems collected from operating agencies and the American Transit Association; and analyze the economy of transportation to be expected on the proposed trans-Java highway. GRA

88 SPACE SCIENCES (GENERAL)

N75-13694# Stichting Nationaal Lucht- en Ruimtevaartlaboratorium, Delft (Netherlands).
REPORT FOR THE YEAR 1973 [VERSLAG OVER HET JAAR 1973]
1973 124 p refs In NORWEGIAN
Avail: NTIS HC $5.25

Aircraft design and development efforts ranged from aerodynamic analyses to spaceflight technology studies. Emphasis is placed on the certification of operational aircraft carrying external stores, and on the preparation of ground operations for the Astronomical Netherlands Satellite (ANS). G.G.

N75-13760* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EDUCATIONAL PROGRAMS AND SERVICES
Garth A. Hull *In its* A Primer in Lunar Geology Jul. 1974 p 491-496 refs (For availability see N75-13730 04-91)
CSCL 05B

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N75-13695 California Univ., Berkeley.
SPECTROSCOPY OF CIRCUMSTELLAR SHELLS Ph.D. Thesis
Richard Rowe Treffers 1973 79 p
Avail: Univ. Microfilms Order No. 74-23976

The composition of circumstellar dust around cool stars was investigated. Spectra are presented of several cool stars in the 10 and 20 micron regions with 2/cm resolution. The oxygen-rich stars show excess emission (emission greater than expected from a star alone) features at both 10 and 20 microns. This is emission by dust grains made of some silicate material. Spectra of the carbon stars show an emission feature between 10.3 and 12.6 microns. This is due to emission by silicon carbide grains in a circumstellar shell. Other unidentified particles are found around both types of star. The problem of correcting for the contribution of the stellar flux in the observed spectra is discussed. Evidence for other types of particles such as graphite is presented.
Dissert. Abstr.

N75-13696 Cornell Univ., Ithaca, N.Y.
RADIO INTERFEROMETER STUDIES OF SOLAR SYSTEM OBJECTS Ph.D. Thesis
Franklin Humphrey Briggs 1974 140 p
Avail: Univ. Microfilms Order No. 74-24266

A radio interferometer is used in the observation of very weak radio sources and for the derivation of radio brightness distributions. Observations of solar system objects which take advantage of the interferometer's special capabilities are presented. Several observing techniques are discussed which distinguish a moving source from a background of stationary sources. Mars, Mercury, and Uranus were observed at 21 cm wavelength and gave disk-average brightness temperature of 179 + or - 11 K, 363 + or - 35 K, and 280 + or - 60 K respectively. High resolution information about Mars implies a surface dielectric constant and a latitude dependent temperature distribution which agrees with radar and infrared determinations. Observations of Saturn show that the rings are effective scatters of microwave radiation but have a very low brightness temperature. Saturn's moon Titan was detected at 3.7 cm wavelength and gave a surface temperature of less than 200 K. Radio detection of thermal emission from the asteroid Ceres is reported. Dissert. Abstr.

N75-13697 Yale Univ., New Haven, Conn.
THE ADVANCED EVOLUTION OF GLOBULAR CLUSTER STARS Ph.D. Thesis
Robert James Zinn 1974 160 p
Avail: Univ. Microfilms Order Noj 74-25792

Globular clusters were searched for stars that lie to the left of the giant branch and above the horizontal branch in the HR-diagram. Stellar structure computations indicate that stars cross this region of the HR-diagram while evolving from the horizontal branch to the white dwarf stage. The stars of interest have brighter U magnitudes than any other cluster stars. This permitted their identification by blinking short exposure U- and V-plates and suggested the name UV-bright stars. Thirty UV-bright stars in the globular clusters M3, M10, M13, M15, M53, M92, NGC 4147, and NGC 5466 were observed spectroscopically at 130 A/mm. Ten of these stars have radical velocities that are consistent with cluster membership. The radial velocity of NGC 5466 (+115 + or - 4 km/sec) was found from the radial velocities of seven red giants. It is suggested that Mayall's radial velocity for M53 should be revised to -89 km/sec.
Dissert. Abstr.

N75-13698*# Southern Univ., Baton Rouge, La. Dept. of Physics.
MANY-PARTICLE THEORY OF NUCLEAR SYSTEMS WITH APPLICATION TO NEUTRON STAR MATTER Research Report, 1 Dec. 1973 - 30 Nov. 1974
Dennis A. Chakkalakal and Chia Hsiung Yang 16 Dec. 1974 25 p
(Grant NGR-19-005-006)
(NASA-CR-141012) Avail: NTIS HC $3.25 CSCL 03A

The energy-density relation was calculated for pure neutron matter in the density range relevant for neutron stars, using four different hard-core potentials. Calculations are also presented of the properties of the superfluid state of the neutron component, along with the superconducting state of the proton component, and the effects of polarization in neutron star matter. N.R.

N75-13699# Calgary Univ. (Alberta). Dept. of Physics.
THE COMPUTATION OF VARIABLE STAR EPHEMERIDES AND THE SELECTION OF PROGRAM STARS Publication of the Rothney Astrophysical Observatory, Series B, No. 1
E. F. Milone [1974] 17 p refs
Avail: NTIS HC $3.25

A general computer program was written to compute hourly variable star phases, hour angles and air masses as an aid to optimizing program star selection when large numbers of stars are involved. The phase is computed for the instant of observation on earth. The uncertainty in phase is of the order + or - 0.001P (-1), where P is the period. The hour angle is given to the nearest minute, and the air mass to .001. Author

N75-13700*# Scientific Translation Service, Santa Barbara, Calif.
SUPERLIGHT EXPANSION OF COMPACT RADIO SOURCES IN QUASARS
V. N. Kurilchik Washington NASA Dec. 1974 14 p refs Transl. into ENGLISH from Priroda (USSR), no. 8, 1974 p 42-47
(Contract NASw-2483)
(NASA-TT-F-16009) Avail: NTIS HC $3.25 CSCL 03A

The expansion is discussed of the radio variable structures of the quasars 3C 273 and 3C 279 at speeds from 4 to 10 C. The hyperlight speeds of quasihyphen sources, and the hyperlight expansion of real sources are analyzed, and a theoretical model of radio variability is described. F.O.S.

N75-13701*# Scientific Translation Service, Santa Barbara, Calif.
UNUSUAL STARS
V. A. Bronshten Washington NASA 23 Dec. 1974 28 p Transl. into ENGLISH from Priroda (USSR), no. 8, 1974 p 79-87
(Contract NASw-2483)
(NASA-TT-F-16010) Avail: NTIS HC $3.75 CSCL 03A

A discussion is given of eclipsing variable stars. The unusual representatives of these stars are analyzed, including the star RU Monocerotis, and 31 and 32 Cygni. Studies have shown that in the chromospheres of these stars there are condensations from 100 to 10,000 km in extent. Author

N75-13702# Geneva Observatory (Switzerland).
A FITTING PROCEDURE FOR CONDUCTIVE OPACITY IN A STELLAR MEDIUM
P. Bouvier and M. Patenaude 1973 14 p refs Repr. from Arch. Sc. (Geneva), v. 26, no. 2, 1973 p 119-131
Avail: NTIS HC $3.25

An expenditious and sufficiently accurate procedure is proposed to include the conductive opacity into the overall opacity of the stellar medium, according to the most recent advances in the theory of electron conduction. The method was successfully tested for a case where previously tabulated opacity values were available. Author

N75-13703# Los Alamos Scientific Lab., N.Mex.
FUTURE SATELLITE EXPERIMENTS FOR GAMMA-BURST OBSERVATIONS
W. D. Evans [1974] 23 p refs Presented at ESLAB Symp. on the Context and Status of Gammaray Astron., Frascati, Italy, 10 Jun. 1974 Sponsored by AEC
(LA-UR-74-868; Conf-740628-1) Avail: NTIS HC $3.25

Based on the presently available data certain objectives for future satellite experiments are identified. Methods for achieving these objectives and the requirements they impose on instrument design and program coordination are described. Some of the experiments planned for launch during the next few years are discussed and the extent to which they will satisfy the objectives is considered. Author (NSA)

N75-13704# Columbia Univ., New York. Dept. of Physics.
THEORY OF PULSARS: POLAR GAPS, SPARKS, AND COHERENT MICROWAVE RADIATION
M. A. Ruderman and P. G. Sutherland 1974 104 p refs
(Contract AT(11-1)-2271)
(COO-2271-31) Avail: NTIS HC $5.25 CSCL 03A

The injection into the near magnetosphere of ultrarelativistic positrons and the pairs subsequently produced by curvature radiation from the positrons is shown to lead to coherent microwave radiation in the frequency range observed in pulsars. The properties and energetics of the sparking in the polar gap lead directly to: (1) the maximum total luminosity of a pulsar and its dependence on period P; (2) the observed drifting of subpulses and quantitative expressions for P sub 2 and P sub 3; (3) microstructure of pulses; and (4) the turn-off of a pulsar as its period increases and aging effects appear. The production of coherent microwave radiation in the near magnetosphere shows qualitative agreement with observations of shapes and widths of pulse envelopes and their period and frequency dependence, and the sweep of linear polarization through the pulse envelope. It is shown why the Crab pulsar gap and the radiation it supports are expected to be different. Author (NSA)

N75-13718* Scripta Publishing Corp., Washington, D.C.
THERMAL INSTABILITY AND ENERGY RELATIONS IN THE CONVECTIVE ENVELOPES OF SLOWLY ROTATING STARS
I. M. Yavorskaya *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 203-223 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 149-163 (For availability see N75-13707 04-90)
CSCL 03B

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N75-13705 California Univ., San Diego.
FLOW PROBLEMS IN ASTROPHYSICAL SYSTEMS Ph.D. Thesis
Charles William Cranfil 1974 182 p
Avail: Univ. Microfilms Order No. 74-23961

The reconnection of magnetic fields, the properties of stellar winds, and the expansion of Hii regions were studied. Models describing steady-state, two-dimensionsl field-line reconnection are reexamined. These models place restrictive upper bounds on the reconnection rates of the systems they describe. Models indicating the global nature of the reconnection flow as a response of external conditions are described and reconstructed. Results show that the flow possesses a pathology near the upstream discontinuities which remains when the effects of dissipation are included. A radially symmetric model for the solar wind at large distances from the sun is presented. The model is used to estimate the free-free soft X-ray flux from the hot plasma downstream of the shock and the free bound soft X-ray flux due to terminating stellar winds near the sun. The stability of the recombination fronts bounding some Hii regions is examined. The effect of radiation pressure on the dynamics of expanding Hii regions is considered. The ionizing radiation is converted in the Hii region to resonant line radiation. The resulting radiation pressure appears to be able to accelerate the flow.
Dissert. Abstr.

N75-13706 Rensselaer Polytechnic Inst., Troy, N.Y.
THE APPLICATION OF CONTINUOUS SLOWING DOWN THEORY TO THE CALCULATION OF SPACE DEPENDENT SPECTRA Ph.D. Thesis
Gilbert Howard Epstein 1974 175 p
Avail: Univ. Microfilms Order No. 74-26071

Two analytical procedures for analyzing space dependent slowing down were developed and applied with good results over the energy range of interest in fast reactors. In the first procedure the standard slowing down equations are modified by the inclusion of collision probabilities to describe the transfer of neutrons across boundaries and by redefining the slowing down parameters in terms of a separable kernel in order to include inelastic scattering. In the second procedure, age theory was modified by incorporation of an explicit integrable first collision source into the age integral and by inclusion of a last flight correction on the age tau. These modifications extended the range of validity of ordinary age, and for single region problems involving iron and depleted uranium have yielded results whose accuracy is at least comparable with that of the Christy-Wheeler kernel. Dissert. Abstr.

N75-13707*# Scripta Publishing Corp., Washington, D.C.
INTERPLANETARY MEDIUM AND PHYSICS OF THE MAGNETOSPHERE
G. A. Skuridin, ed., L. L. Vanyan, ed., V. B. Baranov, ed., O. L Vaysberg, ed., Yu. I. Galperin, ed., A. I. Yershkovich, ed., and M. N. Izakov, ed. NASA Nov. 1974 294 p refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 1-210
(Contract NASw-2484)
(NASA-TT-F-784) Avail: NTIS HC $8.75 CSCL 03B

Various aspects of solar terrestrial physics are considered. Along with articles in which theoretical problems are treated, there are others that describe the results of experiments on spacecraft. For individual titles, see N75-13708 through N75-13723.

N75-13708* Scripta Publishing Corp., Washington, D.C.
CERTAIN PROBLEMS IN THE PHYSICS OF THE MAGNETOSPHERE
A. I. Yershkovich, G. A. Skuridin, and V. P. Shalimov *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 1-33 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 3-25 (For availability see N75-13707 04-90)
CSCL 03B

A review of experimental and theoretical studies devoted to analysis of physical processes in the magnetosphere is presented. Attention is focused on the interrelationships among the most important geophysical phenomena in the magnetosphere: magnetic storms, auroras, the radiation belts, and processes in the geomagnetic tail. Recommendations are submitted for future experiments that are needed for development of a theory of magnetospheric phenomena. Author

N75-13709* Scripta Publishing Corp., Washington, D.C.
HYDROMAGNETIC WAVES GUIDED BY THE GEOMAGNETIC FIELD c46
L. L. Vanyan, L. A. Abramov, M. B. Gokhberg, and V. L. Yudovich *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 34-44 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 26-32 (For availability see N75-13707 04-90)
CSCL 03B

Properties of hydromagnetic waves propagating in the magnetosphere from a source of limited dimensions are considered. It is shown that they are closely related to electric currents flowing along geomagnetic lines of force. The notions developed form a theoretical basis for interpretation of fluctuations and polar bays. Author

N75-13710* Scripta Publishing Corp., Washington, D.C.
MAGNETIC MEASUREMENTS IN MODEL EXPERIMENTS c92
E. M. Dubinin, G. G. Managadze, and I. M. Podgornyy *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 45-58 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 33-43 (For availability see N75-13707 04-90)
CSCL 03B

Plasma parameters for modeling of the interaction between the solar wind and the earth's magnetic field are selected on the limited modeling principle (plasma velocity 3 x 10 to the 7th power cm/sec, density 10 to the 13th power cm/3, electron temperature approximately 15 eV). Measurements were made with magnetic probes capable of developing all 3

components inside the magnetic field. The resulting magnetic field charts indicate that a neutral layer forms on the night side in the model experiments. A magnetosphere free of plasma streams is established on the daytime side. A shock wave forms on the boundary of the magnetosphere, its width c/omega sub 0 in accordance with theory, where omega sub 0 is the total Langmuir width. Author

N75-13711* Scripta Publishing Corp., Washington, D.C.
DISSIPATION OF ENERGY IN MODEL EXPERIMENTS
I. M. Podgornyy *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 59-67 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 44-49 (For availability see N75-13707 04-90)
CSCL 03B

Interaction studies of a plasma stream with a magnetic dipole have shown that the thickness of the plasma/field interlayer is considerably greater than the characteristic plasma dimension c/omega sub 0. Broadening of the layer is due to the formation of a collisionless shock wave. To demonstrate collisionless dissipation, the Joulean losses were calculated using the conductivity value obtained from the skin layer thickness. Analysis of the various physical processes showed that the hypothesis of collisionless dissipation of the directional plasma flow is justified. Author

N75-13712* Scripta Publishing Corp., Washington, D.C.
ANALYSIS OF METHODS OF MEASURING ELECTRIC-FIELD STRENGTH IN THE MAGNETOSPHERE c46
S. I. Klimov *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 68-82 refs Transl. into ENGLISH of the book "Mezphlanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 50-59 (For availability see N75-13707 04-90)
CSCL 03B

Various methods of electric field strength measurements are examined and evaluated as to accuracy, and the requirements made of instrumentation for satellite measurements of electric field strength in the magnetosphere are indicated. Author

N75-13713* Scripta Publishing Corp., Washington, D.C.
HIGH-FREQUENCY TURBULENCE IN THE COSMIC PLASMA
V. A. Gudkova and V. A. Liperovskiy *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 83-102 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 60-73 (For availability see N75-13707 04-90)
CSCL 03B

The problem of quasistationary high frequency Langmuir turbulence, which is one of the types of turbulence encountered in the cosmic plasma, is examined theoretically. Author

N75-13714* Scripta Publishing Corp., Washington, D.C.
STRUCTURAL FORMATIONS IN THE INTERPLANETARY MEDIUM
A. V. Bogdanov *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 103-123 refs Transl. into ENGLISH of the book "Mezphlanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 74-88 (For availability see N75-13707 04-90)
CSCL 03B

Research on the fine structure of the interplanetary medium is reviewed. The characteristics of shock waves, filaments, and contact surfaces according to space probe measurements are discussed. Author

N75-13715* Scripta Publishing Corp., Washington, D.C.
THE INTERNAL STRUCTURE OF THE CONVECTIVE ENVELOPE OF THE SUN c92
I. M. Yavorskaya *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 124-150 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 89-108 (For availability see N75-13707 04-90)
CSCL 03B

An axisymmetric hydrodynamic model of the sun consisting of a core at radiant equilibrium and a convective envelope is studied with consideration of gravitational forces, rotation, turbulence effects, and electromagnetic forces. The dimensionless parameters that control the equations of plasma motion within the sun and the boundary conditions are investigated; estimates are given for these parameters on the basis of experimental data and the existing theoretical models. Stability conditions are derived for convective equilibrium, developed cellular convection, and developed turbulent convection with consideration of rotation and turbulent Reynolds stresses. These conditions characterize the possible physical state of the matter in the convective envelope. Using estimates of the dimensionless parameters and models of some of them, a method of successive approximations is proposed for solution of the problem as a whole. Author

N75-13716* Scripta Publishing Corp., Washington, D.C.
AN INVESTIGATION OF THE COSMIC RADIATION IN THE VICINITY OF THE MOON ON THE LUNA 10, 11, AND 12 ARTIFICIAL LUNAR SATELLITES
N. L. Grigorov, V. G. Kurt, V. N. Lutsenko, V. L. Maduyev, N. F. Pisarenko, and I. A. Savenko *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 151-173 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 109-126 (For availability see N75-13707 04-90)
CSCL 03B

Research on the primary cosmic radiation and solar cosmic rays from the Luna 10, 11, and 12 artificial lunar satellites is reviewed. Data on the vertical distribution of cosmic rays above the moon's surface are presented, and the albedo for the primary radiation is determined. The fluxes of electrons with energies from 30 to 300 keV were registered in the solar cosmic rays. Rapid variations of the electron flux were observed. The angular distributions of 0.5-10 MeV protons moving together with the corpuscular streams responsible for Forbush decreases were investigated. Author

N75-13717* Scripta Publishing Corp., Washington, D.C.
LOW-ENERGY PROTONS OF SOLAR ORIGIN AND INVESTIGATION OF THE INTERPLANETARY MEDIUM c92
V. N. Lutsenko and N. F. Pisarenko *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 175-202 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 127-148 (For availability see N75-13707 04-90)
CSCL 03B

Experimental data on low energy solar protons are presented. A phenomenological classification of the fluxes of these particles is suggested. Contemporary model conceptions of the propagation of low energy proton fluxes are examined, along with information that has been obtained on the properties of the interplanetary medium from study of solar proton fluxes. Author

N75-13718* Scripta Publishing Corp., Washington, D.C.
THERMAL INSTABILITY AND ENERGY RELATIONS IN THE CONVECTIVE ENVELOPES OF SLOWLY ROTATING STARS c89
I. M. Yavorskaya *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 203-223 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 149-163 (For availability see N75-13707 04-90)
CSCL 03B

The nonstationary convection that arises due to thermal instability in the envelopes of lower Main Sequence stars (and the sun in particular) is investigated. The convection that arises in the envelopes as a result of thermal instability is of nonstationary turbulent nature. It is shown that construction of a consistent model of the zones of turbulent convection in the stars requires the use of the complete heat flux equation with consideration of the terms that appear because of turbulence. Expressions for these additional terms in terms of averaged characteristics of the motion and eddy viscosity coefficients are derived on the basis of the Prandtl-Wasiutinsky theory. Author

N75-13719* Scripta Publishing Corp., Washington, D.C.
CALCULATION OF THE SHAPE OF THE BOUNDARY OF

THE MAGNETOSPHERE **c46**
S. A. Martyanov *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 224-246 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 164-178 (For availability see N75-13707 04-90)
CSCL 03B

The possibilities of calculating the shape and dimensions of the magnetopause are discussed. Initial equations are proposed. A review of existing methods is given. Author

N75-13720* Scripta Publishing Corp., Washington, D.C.
TRANSPORT OF CHARGED PARTICLES IN THE EARTH'S MAGNETOSPHERE **c46**
V. P. Shalimov *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 247-265 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 179-190 (For availability see N75-13707 04-90)
CSCL 03B

A review of recent data on and conceptions of processes in which high energy particles are transported across magnetic shells in the earth's magnetosphere is presented. The processes discussed include adiabatic processes (with conservation of all three adiabatic invariants of charged particle motion in the magnetic field), diffusion processes (with violation of only the third or third and second invariants), and the so-called fast nonadiabatic processes, which appear to result from the action of strong electric fields. Author

N75-13721* Scripta Publishing Corp., Washington, D.C.
VIBRATIONS OF THE EARTH'S MAGNETIC TAIL **c46**
A. I. Yershkovich and A. A. Nusinov *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 267-273 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 191-195 (For availability see N75-13707 04-90)
CSCL 03B

The natural vibration period of the tail (regarded as bundle of magnetic line-of-force strings) and the characteristic time of recurrence of magnetospheric substorms are of the same order, suggesting the possibility of a relation between these phenomena. A model of the tail in the form of a plasma cylinder whose free boundary is immersed in the interplanetary plasma is examined. The nature of the natural oscillations of the tail excited by variations of the solar wind pressure is studied in this model. These vibrations have a total energy of approximately 10 to the 22nd power erg, which is sufficient to generate magnetospheric substorms. Author

N75-13722* Scripta Publishing Corp., Washington, D.C.
SHORT-RANGE REPULSIVE FORCES BETWEEN ATOMS AND MOLECULES OF ATMOSPHERIC GASES
A. P. Kalinin, V. B. Leonas, and A. V. Sermyagin *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 275-281 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 196-201 (For availability see N75-13707 04-90)
CSCL 03B

Experimental determination of the paired interaction potential of atoms and molecules composing the atmospheres of the earth and the planets is described. Author

N75-13723* Scripta Publishing Corp., Washington, D.C.
APPARATUS FOR CALIBRATION OF ON-BOARD INSTRUMENTS AND LABORATORY MODELLING OF RAREFIED PLASMA FLOWS PAST MODELS **c35**
Ye. N. Yevlanov, V. B. Leonas, and S. V. Umanskiy *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 282-291 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 202-209 (For availability see N75-13707 04-90)
CSCL 14B

Problems of laboratory simulation of artificial earth satellite flight conditions in the ionosphere are examined, and a setup capable of reproducing the basic parameters of ion flows (with energies of 5-10 eV, energy spectrum width approximately 2x5 eV, and an intensity of 10 to the minus 8th power a/cm/2) past measurement instruments and satellite models is described. Possibilities for further improvement of the apparatus are discussed. Author

N75-13724# Tsukuba Univ. (Japan). Dept. of Physics.
FURTHER REMARKS ON THE LOCAL-SCALE-INVARIANT THEORY OF GRAVITATION
Minoru Omote [1974] 15 p refs
(TUETP-74-13) Avail: NTIS HC $3.25

The local-scale-invariant theory of gravitation in terms of Weyl's geometry is reexamined. The conservation laws for the current and the total energy momentum tensor are obtained. Physical identity of the gauge field is discussed and it is shown that the gauge field is identified with the electromagnetic field. Author

N75-13725# Pennsylvania Univ., Philadelphia. Dept. of Physics.
OBSERVATION OF A POSSIBLE ANTI-NEUTRINO PULSE OF EXTRATERRESTRIAL ORIGIN
K. Lande, G. Bozoki, W. Frati, C. K. Lee, E. Fenyves (Tex. Univ., Dallas), and O. Saavedra (Torino Univ.) 17 May 1974 10 p refs Sponsored by AEC
(COO-3071-94) Avail: NTIS HC $3.25

An unusual event observed during a search for antineutrino bursts of extraterrestrial origin is reported. The experiment employs a deep underground antineutrino burst detector station at a depth of 4400 m.w.e. in the Homestake gold mine in Lead, South Dakota. On Jan. 4, 1974 at 17 hrs. 10 min. 32 sec. GMT an event involving a total of 24 pulses within 3 msec was observed in six of the eight large water Cherenkov counters. NSA

N75-13732* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FORMATION OF THE SOLAR SYSTEM
David Black *In its* A Primer in Lunar Geology Jul. 1974 p 13-25 refs (For availability see N75-13730 04-91)
CSCL 03B

N75-13733* Sussex Univ., Brighton (England). Astronomy Centre.
ORIGIN OF THE SOLAR SYSTEM: REVIEW OF CONCEPTS AND THEORIES
W. H. McCrea *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 26-41 refs (For availability see N75-13730 04-91)
CSCL 03B

N75-13734* Institut d'Astrophysique, Paris (France).
PRESENTATION OF THE MODELS
Hubert Reeves *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 42-67 refs (For availability see N75-13730 04-91)
CSCL 03B

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N75-13726 Michigan Univ., Ann Arbor.
ACOUSTICS OF METEORS-EFFECTS OF THE ATMOSPHERIC TEMPERATURE AND WIND STRUCTURE ON THE SOUNDS PRODUCED BY METEORS Ph.D. Thesis
Douglas Orson ReVelle 1974 459 p
Avail: Univ. Microfilms Order No. 74-25306

In recent years several investigators have reported ground based measurement of pressure waves associated with the entry of bright fireballs into the earth's atmosphere. A theoretical study was undertaken to better understand this phenomenon. Atmos-

pheric models were developed in order to study meteor entry dynamics as well as to study atmospheric sound propagation. Two models of meteors as sound producers are then considered. Using the presently accepted range meteor parameters velocity altitude profiles are determined for two limiting extremes of the motion. The constraints imposed allow a determination of the maximum and minimum penetration depth of a given meteor into the atmosphere. Using the above considerations, an effective meteor model is constructed. Dissert. Abstr.

N75-13727 Kentucky Univ., Lexington.
VERTICAL STRUCTURE OF THE UPPER JOVIAN ATMOSPHERE Ph.D. Thesis
Joseph Jan Michalsky, Jr. 1974 83 p
Avail: Univ. Microfilms Order No. 74-19624

A routine was developed which allowed abrupt changes in the physical properties of various layers of a model Jovian atmosphere. The major difficulty was choosing an intensity distribution function which allowed the approximation of the real intensity as a function of optical depth, yet was simple enough to allow the incorporation of inhomogeneities into the model. The variational method rendered the greatest lower bound to the reflection function for a particular atmospheric model by extremizing with respect to the variables of this intensity function. A combination of step and linear functions were used to represent the intensity function. The strong and weak methane bands were investigated, along with the weak ammonia band, using other physical models. Close theoretical agreement was obtained. It is shown that with a determination of physical properties of the gas layer overlying the cloud structure, the true physical properties of the upper atmosphere can be attained. Dissert. Abstr.

N75-13728*# Saint Louis Univ., Mo.
REINTERPRETATION OF MARINER 9 IRIS DATA ON THE BASIS OF A SIMULATION OF RADIATIVE-CONDUCTIVE CONVECTIVE TRANSFER IN THE DUST LADEN MARTIAN ATMOSPHERE Final Report, Oct. 1973 - Dec. 1974
A. J. Pallman Nov. 1974 80 p refs
(Grant NGR-26-006-042)
(NASA-CR-141110; PLATMOS-9) Avail: NTIS HC $4.75 CSCL 03B

Time dependent vertical distributions of atmospheric temperature and static stability were determined by a radiative-convective-conductive heat transfer model attuned to Mariner 9 IRIS radiance data. Of particular interest were conditions of both the dust-laden and dust-free atmosphere in the middle latitudes on Mars during the late S.H. summer season. The numerical model simulates at high spatial and temporal resolution (52 atmospheric and 30 subsurface levels; with a time-step of 7.5 min.) the heat transports in the ground-atmosphere system. The algorithm is based on the solution of the appropriate heating rate equation which includes radiative, molecular-conductive and convective heat transfer terms. Ground and atmosphere are coupled by an internal thermal boundary condition. Author

N75-13729*# National Aeronautics and Space Administration, Washington, D.C.
THE NEW MARS: THE DISCOVERIES OF MARINER 9
William K. Hartmann and Odell Raper 1974 192 p refs
Original contains color illustration
(NASA-SP-337; LC-74-600084) Avail: NTIS MF $2.25; SOD HC $8.75 CSCL 03B

The Mariner 9 encounter with Mars is extensively documented with photographs taken by the satellite's onboard cameras, and an attempt is made to explain the observed Martian topography in terms of what is known about the geomorphological evolution of the earth. Early conceptions about the Mars surface are compared with more recent data made available by the Mariner 9 cameras. Other features of the planet Mars which are specifically discussed include the volcanic regions, the surface channels, the polar caps and layered terrain, the Martian atmosphere, and the planet's two moons--Phobos and Deimos. A.A.D.

N75-13730*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A PRIMER IN LUNAR GEOLOGY
Ronald Greeley, ed. (Univ. of Santa Clara) and Peter H. Schultz, ed. Jul. 1974 546 p refs
(NASA-TM-X-62359) Avail: NTIS HC $12.50 CSCL 03B

Primary topics in lunar geology range from the evolution of the solar system to lunar photointerpretation, impact crater formation, and sampling to analyses on various Apollo lunar landing site geomorphologies. For individual titles, see N75-13731 through N75-13768.

N75-13731* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SOURCES OF LUNAR GEOLOGICAL DATA
Ronald Greeley (Univ. of Santa Clara) *In its* A Primer in Lunar Geology Jul. 1974 p 3-11 (For availability see N75-13730 04-91)
CSCL 03B

Geologic data for the moon are derived from three general sources: (1) earth based observations, (2) remote sensing by unmanned spacecraft, and (3) collection of data by manned lunar missions. The types of data include photographs, infrared and other invisible spectrum data, geophysical data from seismometers, etc., rock samples, and visual observations. Author

N75-13732* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FORMATION OF THE SOLAR SYSTEM **c90**
David Black *In its* A Primer in Lunar Geology Jul. 1974 p 13-25 refs (For availability see N75-13730 04-91)
CSCL 03B

The available evidence strongly suggests that planets formed by accretion through a hierarchy of particle masses. The terminal stages for this process probably involved collisions between large bodies. The region of the solar system which is known as the asteroid belt is one where for some reason this accretion process was not carried to completion. The terminal phase of planetary formation was a hectic one in the sense that high velocity debris of varying sizes were moving from as far out as Jupiter into the region of the terrestrial planets. Most of the terrestrial planets were surrounded by swarms of smaller bodies during this terminal phase. The moon, or the bulk of it, was formed in a region of the solar system different than that in which the earth formed, and was captured upon close passage to the earth as a consequence of a collision with circum-terrestrial material. Once captured, its surface was bombarded by particles in terrestrial orbit, as well as particles like the moon which came from other regions of the solar system. Author

N75-13733* Sussex Univ., Brighton (England). Astronomy Centre.
ORIGIN OF THE SOLAR SYSTEM: REVIEW OF CONCEPTS AND THEORIES **c90**
W. H. McCrea *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 26-41 refs (For availability see N75-13730 04-91)
CSCL 03B

A short outline is given of some of the main empirical features of the solar system. Cataclysmic theories of its origin are briefly mentioned. The general concept of a solar nebula is described. Accumulation theories of the formation of planets from the nebula are sketched with some critical comments. A proto-planet theory of the origin of planets and satellites is then considered. An attempt is made to place as much as possible of the work in a general setting and to call attention to a number of physical mechanisms that feature in one way or another in a number of theories. Author

N75-13734* Institut d'Astrophysique, Paris (France).
PRESENTATION OF THE MODELS **c90**
Hubert Reeves *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 42-67 refs (For availability see N75-13730 04-91)
CSCL 03B

Various models of the solar system are presented and the probability of formation of solar systems in the general course of stellar evolution is discussed. The theoretical models associate the solar system with astronomical statistical observations of interstellar clouds or young stars. Most models assume that the sun and the planets issued from the same cloud; one model

presents a capture scenario where the sun, already formed, has captured, through its magnetic field, a cloud of interstellar matter. G.G.

N75-13735* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
METEORITES: CLUES TO THE ORIGIN OF THE SOLAR SYSTEM
T. E. Bunch *In its* A Primer in Lunar Geology Jul. 1974 p 71-88 refs (For availability see N75-13730 04-91)
CSCL 03B

Meteorites are rock and metal fragments, smaller than planets and larger than molecules, of disrupted planetary bodies. Although they are commonly referred to as space debris, they are scientifically important for the understanding of solar system origin, and possibly earth origin. Much has been learned about their early geologic history, ages, pre-terrestrial orbits, environmental condition, organic contents, and shock events. These results have been applied in turn to interpreting the origin of the solar system and comets. An introduction to meteorites and their significance is provided and a glossary of terminology is given. Author

N75-13736* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A REVIEW OF LUNAR SURFACE FEATURES
Peter H. Schultz *In its* A Primer in Lunar Geology Jul. 1974 p 91-133 refs (For availability see N75-13730 04-91)
CSCL 03B

Photographic records of different lunar surface features are evaluated according to a classification scheme that uses craters, positive relief, and negative relief for geomorphological interpretation. G.G.

N75-13737* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IMPACT CRATERING
Donald E. Gault *In its* A Primer in Lunar Geology Jul. 1974 p 137-175 refs (For availability see N75-13730 04-91)
CSCL 03B

This presentation illustrates that commencing in time from the initial stages of the condensation of solids from the solar nebula and their subsequent accretion into planetary objects, collisions between the condensates have played a primary role in planetary evolution in general and for the moon in particular. Principal emphasis is focused on collisions in an excavation mode; i.e., impact cratering which represents a geologic agent for: (1) Major landforms and stratigraphic units; (2) metamorphism; (3) comminution; (4) erosion, transport, and sedimentation; and (5) formation and mixing of the lunar regolith. Because an appreciation of the physics of stress waves and cratering mechanics is essential to understanding of impact processes as a geologic agent, some basic properties of stress waves with specific applications to geologic aspects and to cratering mechanics are elaborated. Lunar cratering is then considered starting from an evaluation of sources for the impacting bodies and particles, and leading into the subject of the long term (geologic) effects of impact cratering. Finally, the importance of the historical record of cratering appearing on the lunar surface is reviewed in regard to the implications to the evolution of the planets and the early history of the solar system. Author

N75-13738* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IMPACT CRATERING MECHANICS AND STRUCTURES
c46
Donald E. Gault, William L. Quaide, and Verne R. Oberbeck *In its* A Primer in Lunar Geology Jul. 1974 p 177-189 refs Repr. from Shock Metamorphism of Natural Materials, 1968 p 87-89 (For availability see N75-13730 04-91)
CSCL 08E

Hypervelocity impact craters formed in the laboratory in low- and variable-strength materials have provided insight into the mechanics of the formation and the resultant structures of meteorite craters. Three stages in the development of a crater are recognized: (1) an initial shock wave compression of projectile and target, during which kinetic energy is transferred from impacting body to the ground; (2) an excavation stage, during which the crater is actually formed as the result of particle motions produced by the shock waves; and (3) a stage of post-cratering modification of the basic impact-basin by geologic processes. Crater structures produced in low strength target materials are remarkably similar to those found in certain large meteorite craters. Upwarped rims with inverted stratigraphy, near surface overthrusts, stratigraphically deep underthrusts, and polygonal rims have all been observed. These structures are consistent with, and are the natural consequence of, the particle motions and deformations associated with the mechanics of formation of an impact crater. Author

N75-13739* London Univ. Observatory (England).
PRINCIPLES OF EXTRATERRESTRIAL GEOLOGICAL MAPPING
John Guest *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 193-197 refs (For availability see N75-13730 04-91)
CSCL 03B

At present, nearly all lunar and planetary mapping is, perforce, done from spacecraft pictures using much the same techniques as are used in normal photogeology. Of course this requires some interpretation because it is necessary to decide what represents a rock unit, the fundamental mapping unit. This is not such a great problem on the moon as it is on the earth or Mars because on the moon there is no running water or atmosphere, nor are there any climatic belts. The main process that modifies the surface is that of meteoroid bombardment, which is a process that operates almost uniformly over the whole surface of the moon. Thus, differences in surface form from one area to another relate directly to the underlying rock, age, composition, lithology and mode of formation. It should be noted that a resolution of at least 1.5 km is required to do useful stratigraphy. Author

N75-13740* Geological Survey, Menlo Park, Calif.
INTERAGENCY REPORT: ASTROGEOLOGY 55, GEOLOGIC MAPPING OF THE SECOND PLANET. PART 1: RATIONALE AND GENERAL METHODS OF LUNAR GEOLOGIC MAPPING. PART 2: TECHNICALITIES OF MAP CONVENTIONS, FORMAT, PRODUCTION MECHANICS, AND REVIEWING. PART 3: HISTORY OF THE US GEOLOGICAL SURVEY LUNAR GEOLOGIC MAPPING PROGRAM
Don E. Wilhelms *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 199-238 refs Repr. from Interagency Rept.: Astrogeology 55, Geologic Mapping of the Second Planet, NASA p 1-36 (For availability see N75-13730 04-91)
(NASA Order W-13294)
CSCL 03B

It is shown that lunar geological mapping is similar in philosophy and principle, as well as in many details of method, to terrestrial geological mapping. Photointerpretation provides information on the structure of the whole moon and the geometric relations, areal distribution, and sequence of formation of its crystal elements. G.G.

N75-13741* Geological Survey, Flagstaff, Ariz.
GEOLOGICAL PROVINCES OF THE NEAR SIDE OF THE MOON
J. F. McCauley and D. E. Wilhelms *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 239-243 refs Repr. from ICARUS, v. 15, no. 3, Dec. 1971 p 363-367 (For availability see N75-13730 04-91)
CSCL 03B

Systematic geologic mapping of the near side of the moon has provided the basis for defining and delineating the major geological provinces of the near side. From the nature of the provinces and their distribution patterns a general historical sequence evolves. Five main surface-shaping periods are recognized: (1) one of intense early impact cratering; (2) another, probably overlapping the first, during which the impact basins were formed; (3) a prolonged period of varied terra volcanism; (4) a short period of mare volcanism that resulted in filling of the multiring basins; and (5) a period of diminishing volcanic activity continuing up to the time of formation of the last ray craters. Author

N75-13742* Geological Survey, Menlo Park, Calif.
TWO FORMER FACES OF THE MOON
Don E. Wilhelms and Donald E. Davis *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 245-249 refs (For availability see N75-13730 04-91)
CSCL 03B

Systematic geologic mapping of the lunar near side has resulted in the assignment of relative ages to most visible features. As a derivative of this work, geologic and artistic interpretations have been combined to produce reconstructions of the moon's appearance at two significant points in its history. The reconstructions, although generalized, show the moon as it probably appeared about 3.3 billion years ago after most of the mare materials had accumulated, and at about 4.0 billion years ago after formation of the youngest of the large multiringed basins, but prior to appreciable flooding by mare material. Author

N75-13743* Geological Survey, Menlo Park, Calif.
MULTI-RING BASINS AND MASCONS
Keith A. Howard *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 253-274 refs (For availability see N75-13730 04-91)
CSCL 03B

Large positive gravity anomalies characterize all obvious mare filled circular basins on the near side. The gravity field was identified from anomalous accelerations of lunar orbiters. The positive free air anomalies represent mass concentrations nicknamed mascons. Most mascons seem best explained as thin discs of dense mare basalt. Recent geologic mapping of the lunar limbs and far side, together with Apollo results, appear to confirm that multi-ring basins account for most or all pre-mare regional deposits and structures expressed in the lunar landscape. Highland deposits of plains, furrowed and pitted terrain, and various hills, domes, and craters that were interpreted before the Apollo missions as volcanic can now be interpreted as basin-related. A province map of the whole moon shows that the relatively young Orientale and Imbrium basins imprinted and rejuvenated much of the moon's surface. Several nearly obliterated basins have been discovered recently, including a deep one on the far side that is as wide as the moon's radius. The presence of these ancient basins suggests that the surface is effectively saturated by basins and that many others were completely destroyed by later impacts. Author

N75-13744* Geological Survey, Menlo Park, Calif.
LUNAR MARIA AND CIRCULAR BASINS: A REVIEW
Desiree E. Stuart-Alexander and Keith A. Howard *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 275-291 refs Repr. from ICARUS, v. 12, 1970 p 440-456 (For availability see N75-13730 04-91)
(NASA Order R-66)
CSCL 03B

Lunar orbiter data make it possible to examine the distribution and relations of maria and large circular basins over the entire moon. The restricted distribution and age of the maria are in marked contrast to the apparently random distribution in time and place of the circular basins, some of which contain mare fillings. The circular basins are believed to be impact scars, and the maria to be volcanic fills which in each case are younger than the structures they fill. Twenty-nine circular basins 300 km wide or wider are recognized. They are placed in an age sequence because successive stages of degradation can be recognized from the fresh Orientale basin to the almost obliterated basin containing Mare Australe. Author

N75-13745* Santa Clara Univ., Calif.
VOLCANISM AS A PLANETARY PROCESS
Ronald Greeley *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 295-322 refs (For availability see N75-13730 04-91)
CSCL 03B

A brief review is given of the more common volcanic features that have been identified on the Moon and Mars and some possible terrestrial analogs are offered. The features described include volcanic vents, flood-type lava flows, volcanic rilles, and lava domes. Author

N75-13746* New Mexico Univ., Albuquerque. Dept. of Geology.
IDENTIFICATION, DISTRIBUTION AND SIGNIFICANCE OF LUNAR VOLCANIC DOMES
Eugene I. Smith *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 323-351 refs Repr. from the Moon, v. 6, 1973 p 3-31 (For availability see N75-13730 04-91)
(Grant NGL-32-004-011)
(Contrib-33) CSCL 03B

Over 300 previously unrecognized volcanic domes were identified on lunar orbiter photographs using the following criteria: (1) the recognition of land forms on the moon similar in morphology to terrestrial volcanic domes; (2) structural control; (3) geomorphic discordance; and (4) the recognition of land forms modified by dome-like swellings. Many terrestrial volcanic domes are similar in morphology to lunar domes. This analogy suggests that some lunar hills are in fact extrusive volcanic domes. Many of the domes identified seem to be related to basins and craters, and with the exception of local tectonic grid control few domes are related to any observable moon-wide pattern. Domes are not uniquely found on maria. Dome formation probably spans a wide range of lunar time and activity in areas where domes are located may be continuing to the present as revealed by the close correlation of dome distribution with the distribution of lunar transient events. Author

N75-13747* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LAVA TUBES AND CHANNELS IN THE LUNAR MARIUS HILLS
Ronald Greeley *In its* A Primer in Lunar Geology Jul. 1974 p 353-378 refs Repr. from the Moon, v. 3, 1971 p 289-314 (For availability see N75-13730 04-91)
CSCL 03B

The Marius Hills region, a volcanic plateau in Oceanus Procellarum, contains numerous rilles, rille-like structures, and chains of elongate craters. Most of these structures characteristically: (1) originate on or near irregular shaped craters associated with features previously interpreted as volcanic domes; (2) trend downslope onto plateau plains; (3) generally taper in width and become shallower; (4) are often discountinuous; (5) occupy the center, or apparent crest of a broad ridge; (6) may contain cut-off branches and distributary structures; and (7) may have local reversals in longitudinal slope. Structures having these characteristics are interpreted to be lava channels or partly collapsed lava tubes. Terrestrial analogs are offered for structures described in the Marius Hills. The analogs are comparable in qualitative and quantitative geomorphic aspects, excluding that of width. Scaling consideration of lunar reduced gravity accounts for increased width of the lunar structures. Linear and curvilinear rilles trending along equal elevations are interpreted to result from fracturing or faulting. Author

N75-13748* Santa Clara Univ., Calif.
LUNAR GEOPHYSICS
Curtis W. Parkin *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 381-388 refs (For availability see N75-13730 04-91)
CSCL 03B

During the Apollo missions, geophysical instruments were deployed on the lunar surface and in orbit around the moon to study geophysical properties of the moon's interior and its near environment. A summary is presented concerning some of the findings of these geophysical experiments. Though several experiments have yielded extremely interesting results concerning extralunar properties, emphasis is placed on experimental results pertaining to the lunar interior and atmosphere. Results are presented for the following experiments: (1) passive and active seismometers; (2) magnetometers; (3) heat flow experiment; (4) laser altimeter; (5) gamma ray, X-ray, and alpha particle experiments; and (6) mass spectrometer experiments. Author

N75-13749* California Inst. of Tech., Pasadena.
THE INTERIOR OF THE MOON
Don L. Anderson *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 389-394 refs Repr. from Phys. Today, Mar. 1974 (For availability see N75-13730 04-91)

(Grant NGL-05-002-069)
(Contrib-2447) CSCL 03B

Measurements are reported on the shape of the moon, its gravity field, the electromagnetic fields in its vicinity, heat flow through the surface, the seismic activity and velocities in the interior, the composition of the surface and the tenuous lunar atmosphere. From these measurements are drawn conclusions about the composition, temperature and history of the moon; some of these conclusions confirm earth based observations, but others are unexpected. Examination of surface samples shows that the moon is deficient in all elements and compounds more volatile than iron, and that it has a low density crust of great age and thickness. The temperature of the interior is still a puzzle, with new evidence confirming neither the hot core nor the cold core theories. Author

N75-13750* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
GEOLOGY OF THE APOLLO LANDING SITES: A SUMMARY
W. L. Quaide *In its* A Primer in Lunar Geology Jul. 1974 p 397-405 refs (For availability see N75-13730 04-91)
CSCL 03B

The geology of the Apollo lunar landing sites is discussed by relating geophysical findings at each side to a generalized picture of lunar geological history. G.G.

N75-13751* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SUMMARY OF SCIENTIFIC RESULTS: APOLLO 11
W. N. Hess and A. J. Calio *In its* A Primer in Lunar Geology Jul. 1974 p 407-413 Repr. from Apollo 11 : Preliminary Sci. Rept., NASA SP-214, 1969 (For availability see N75-13730 04-91)
CSCL 03B

Major findings from the Apollo 11 mission indicate that the composition of crystalline lunar rocks differs from terrestrial rocks and meteorites; lunar samples are enriched in refractory elements and some alkali and volatile elements are depleted. The absence of hydrated minerals suggests that no surface water has existed at Tranquility base and that crystalline rocks were formed under low partial pressures. Breccia contained large amounts of nobel gases with elemental and isotopic abundances indicative of origin in the solar wind. No evidence of biological material has been found but evidence of shock and impact metamorphism is common. G.G.

N75-13752* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SUMMARY OF SCIENTIFIC RESULTS: APOLLO 12
M. Gene Simmons (MIT) and A. J. Calio *In its* A Primer in Lunar Geology Jul. 1974 p 415-420 Repr. From Apollo 12: Preliminary Sci. Rept., NASA SP-235, 1970 (For availability see N75-13730 04-91)
CSCL 03B

The Apollo 12 mission provided the first opportunity in the scientific exploration of the moon to sample extensively the rocks within a radius of 1/2 km of the landing site, to obtain geologic data from firsthand observations made on the moon, to measure on the surface of the moon the vector components of the lunar magnetic field, to measure the pressure of the lunar atmosphere, and to collect seismic data on the interior of the moon from the impact of the lunar module (LM) ascent stage. Results indicate that soil and rock compositions at the Apollo 12 landing site are similar to those encountered at Apollo 11 and Surveyor 3 landing sites. Seismic energy release was far less for the moon than for the earth. Magnetic gradient measurements established a local magnetic body of at least + 0.2 km in size at the landing site. Solar wind spectra at the lunar surface were similar to those of the solar plasma. Stereoscopic photography established the remarkable absence of dust on lunar rocks. Author

N75-13753* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SUMMARY OF SCIENTIFIC RESULTS: APOLLO 14
Philip K. Chapman, Anthony J. Calio, and M. Gene Simmons *In its* A Primer in Lunar Geology Jul. 1974 p 421-428 Repr. from Apollo 14: Preliminary Sci. Rept., NASA SP-272, 1971 (For availability see N75-13730 04-91)
CSCL 03B

Measurements and observations on the Apollo 14 lunar landing site indicated differences in rock compositions as compared with rocks from earlier Apollo missions; isotopes of nobel gases yielded lower exposure values for the rocks. Passive seismic experiments detected more natural seismic events that corresponded to meteoroid impact and moonquakes. The presence of argon was detected in the solar wind experiment. Magnetometer and gravity field studies established a mascon with a flat topped appearance. The spacecrew also performed some demonstrations of composite casting, electrophoretic separation, gravity induced heat convection, and liquid transfer and expulsion by buffles. G.G.

N75-13754* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SUMMARY OF SCIENTIFIC RESULTS: APOLLO 15
Joseph P. Allen *In its* A Primer in Lunar Geology Jul. 1974 p 429-439 refs Repr. from Apollo 15: Preliminary Sci. Rept., NASA SP-289, 1972 (For availability see N75-13730 04-91)
CSCL 03B

Geological and photographic studies of the Apollo 15 landing site gave similar results to those from earlier Apollo landing sites. Heat flow measurements in the lunar crust established the moon as a far more radioactive body than had been previously suspected. Preliminary data on gamma ray activity of the lunar surface showed a strong contrast in count rates over different regions of the moon, and preliminary X-ray fluorescent measurements indicated a difference in chemical compositions for maria and highlands. G.G.

N75-13755* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SUMMARY OF SCIENTIFIC RESULTS: APOLLO 16
Anthony W. England *In its* A Primer in Lunar Geology Jul. 1974 p 441-448 ref Repr. from Apollo 16: Preliminary Sci. Rept., NASA SP-315, 1972 (For availability see N75-13730 04-91)
CSCL 03B

The exploration of the Descartes region by the Apollo 16 crewmen provides the best look at lunar highlands. The surprise at Descartes was the state of the rocks, not their composition. That is, breccias rather than volcanics were dominant. The compositions are near those of anorthositic gabbro and gabbroic anorthosite. This composition is consistent with the hypothesis that highlands are an early differentiate of a primitive lunar mantle. Aluminum-to-silicon (Al/Si) and magnesium-to-silicon (Mg/Si) ratios, as determined by the orbiting X-ray fluorescence experiment, indicate that the Descartes area differs compositionally from previous Apollo sites and that its chemical characteristics are representative of large regions of the lunar highlands. Author

N75-13756* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SUMMARY OF SCIENTIFIC RESULTS: APOLLO 17
Robert A. Parker *In its* A Primer in Lunar Geology Jul. 1974 p 449-455 Repr. from Apollo 17: Preliminary Sci. Rept., NASA SP-330, 1973 (For availability see N75-13730 04-91)
CSCL 03B

The basic objective of the Apollo 17 mission was to sample basin rim highland material and adjacent mare material and investigate the geological evolutionary relationship between these two major units. In general, obtained data were similar to those of earlier Apollo lunar missions. An event of great interest was the discovery of deposits of orange glass on a crater rim; indications are that the orange glass is about 3.7 x 10 to the ninth power years old. The seismic profiling experiment confirmed a three layer model for the valley floor with a homogeneous lithosphere that encloses an asthenosphoric zone of partial melting. Moonquake activity appeared to be concentrated at the boundary between these two zones. G.G.

N75-13757* Geological Survey, Menlo Park, Calif.
THE GEOLOGY OF MARS
Michael H. Carr *In* NASA. Ames Res. Center A Primer in

Lunar Geology Jul. 1974 p 459-460 (For availability see N75-13730 04-91)
CSCL 03B

The Mariner 9 mission revealed Mars to be a much more diverse planet geologically than had been anticipated. Large volcanoes of widely different ages and extensive fracture systems attest to a long history of internal activity while the preservation of large areas of primitive densely cratered terrain indicates that crustal mobility and erosional processes have been far less effective than on earth in destroying the early record. Perhaps the greatest surprise of Mariner 9 was the discovery of fluvial-like features. Since liquid water is unstable under present conditions at the Martian surface, the presence of the channels indicates either an origin other than aqueous or climatic conditions in the past that were quite different from those that presently prevail. The great canyons and numerous cliff-like features suggestive of active erosion were also surprises, as were the widespread layered deposits at the poles. Author

N75-13758* Geological Survey, Menlo Park, Calif.
A GENERALIZED GEOLOGIC MAP OF MARS
M. H. Carr, Harold Masursky (U.S. Geol. Surv., Flagstaff, Ariz.), and R. S. Saunders (JPL) *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 461-466 refs Repr. from J. Geophys. Res., v. 78, no. 20, Jul. 1973 p 4031-4036 Revised (For availability see N75-13730 04-91)
CSCL 03B

A geologic map of Mars has been constructed largely on the basis of photographic evidence. Four classes of units are recognized: (1) primitive cratered terrain; (2) sparsely cratered volcanic eolian plains; (3) circular radially symmetric volcanic constructs such as shield volcanoes, domes, and craters; and (4) tectonic erosional units such as chaotic and channel deposits. Grabens are the main structural features; compressional and strike slip features are almost completely absent. Most grabens are part of a set radial to the main volcanic area, Tharsis. Author

N75-13759* Geological Survey, Flagstaff, Ariz.
AN OVERVIEW OF GEOLOGICAL RESULTS FROM MARINER 9
Harold Masursky *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 467-488 refs Repr. from J. Geophys. Res., v. 78, no. 20, Jul. 1973 p 4009-4030 Revised Prepared for JPL (For availability see N75-13730 04-91)
(Contract JPL-WO-8122)
CSCL 03B

Mariner 9 acquired pictures of all of Mars. From these data, preliminary scale photomosaics have been made of the entire planet, and a 1:25,000,000 scale shaded relief map published. The more than 7300 pictures acquired indicate that Mars is more varied and dynamic than previously inferred. About one half of the surface consists of ancient cratered terrain. The remainder of the surface is covered either by younger volcanic rocks and constructs that stand as much as 17 km above the mean level or by extensive tracts of plains deposits, some of which are sedimentary in origin. The volcanic piles with summit calderas have fresh flank flows and appear to be geologically young. The great equatorial chasm or canyon system terminates in a complexly faulted plateau to the west and in large patches of chaotic terrain on the east. Large fluvial channels originate in this chaotic terrain possibly by melting of permafrost and appear to flow northward into the Chryse region. Many small dendritic channel networks abound in the equatorial regions and imply possible collection of rainfall. In addition, many small lava channels with distinctive characteristics are present. Many of the basin floors are underlain by lava flows inferred to be basaltic from the form of the flows, ridges, and domes that characterize their surface. The polar regions are covered by glacio-eolian layered sediments that appear to be still forming. Author

N75-13760* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EDUCATIONAL PROGRAMS AND SERVICES c88
Garth A. Hull *In its* A Primer in Lunar Geology Jul. 1974 p 491-496 refs (For availability see N75-13730 04-91)
CSCL 05B

NASA's Ames Research Center is responsible for providing to colleges and universities in the eleven western states - including California and Oregon - speakers, films, publications, and center visits to augment school curriculums with aerospace information, including Apollo lunar landing exploration. Author

N75-13761* Santa Clara Univ., Calif.
APPROACHES FOR TEACHING PLANETOLOGY c80
Ronald Greeley *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 499-500 (For availability see N75-13730 04-91)
CSCL 05B

The primary objective of the short course in lunar geology is to provide information and ideas for instructors so that aspects of planetology can be introduced or expanded in their earth science curriculum. Although the ways that this is accomplished are probably as varied as the number of participants, some suggestions for incorporating planetology into earth science programs are offered. Three general possibilities are: (1) Supplemental instruction in existing courses; (2) introduction of special projects or formal courses in planetology; and (3) introduction of short courses for high school instructors, or as community affairs programs. Author

N75-13762* Santa Clara Univ., Calif.
SELENOLOGY EXERCISE
Ronald Greeley *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 501-503 (For availability see N75-13730 04-91)
CSCL 03B

Analysis of lunar photographs, charts and reference materials is used to become acquainted with the physical characteristics of the moon. Author

N75-13763* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LUNAR PHOTO EXERCISE
Peter H. Schultz *In its* A Primer in Lunar Geology Jul. 1974 p 505-526 (For availability see N75-13730 04-91)
CSCL 03B

Photographs of lunar craters with increasing resolution and maps of the moon are utilized to introduce students to lunar surface features and to learn problems of photointerpretation. Author

N75-13764* Santa Clara Univ., Calif.
IMPACT CRATER EXPERIMENTS c46
Ronald Greeley *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 527-531 refs (For availability see N75-13730 04-91)
CSCL 08E

Observations of laboratory produced craters, films of hypervelocity experiments and comparative analyses of lunar craters are advocated. To learn the mechanics of impact cratering on the lunar surface. Author

N75-13765* Santa Clara Univ., Calif.
GEOLOGIC MAPPING EXERCISE
Ronald Greeley *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 533-535 (For availability see N75-13730 04-91)
CSCL 03B

To produce a lunar photogeologic map, mapping methods and time scales are used. Units should be placed in the lunar time scale, described, and their possible origins discussed. Author

N75-13766* Santa Clara Univ., Calif.
LUNAR SAMPLES
Ronald Greeley *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 537-539 (For availability see N75-13730 04-91)
CSCL 03B

Mineralogy and petrology of lunar surface rocks are studied by familiarization with common rock textures and structure as related to their mode of formation. Comparison of terrestrial rocks with lunar samples through the use of thin sections and pseudo-sections is advocated. Author

N75-13767* Santa Clara Univ., Calif.
APOLLO LANDING SITE EXERCISE
Ronald Greeley *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 541-567 (For availability see N75-13730 04-91)
CSCL 03B

To select an Apollo landing site by applying current knowledge of lunar geology to the analysis of lunar data, photographs, and maps. Author

N75-13768* Massachusetts Univ., Amherst.
USE OF LUNAR ORBITER PHOTOGRAPHS IN EARTH SCIENCE COURSES **c80**
George E. McGill and Paul A. Chizook *In* NASA. Ames Res. Center A Primer in Lunar Geology Jul. 1974 p 569-574 refs Repr. from J. Geol. Educ., v. 19, no. 1, Jan. 1971 (For availability see N75-13730 04-91)
(Grant NGR-22-010-052)
CSCL 05B

A very small number of lunar orbiter photographs are suggested that are superior for illustrating geologic features and the principles of stratigraphy and historical geology. Only orbiter photographs are considered. Some of the Apollo pictures currently becoming available are certainly spectacular, but few are as suitable as the orbiter photographs for general geologic purposes. Reference to available Apollo photographs is included in the appendix, which also includes information on ordering orbiter photographs, lunar maps, and other useful materials. Author

N75-13769*# Kanner (Leo) Associates, Redwood City, Calif.
ACCURACY OF DETERMINATION OF THE DIELECTRIC CONSTANT AND THE TEMPERATURE OF A SUBSURFACE LAYER FROM POLARIZATION MEASUREMENTS
N. N. Krupenio, V. A. Ladygin, and N. Ya. Shapirovskaya Washington NASA Dec. 1974 14 p refs Transl. into ENGLISH from Kosm. Issled. (USSR), v. 12, no. 5, Sep.-Oct. 1974 p 740-747
(Contract NASw-2481)
(NASA-TT-F-16096) Avail: NTIS HC $3.25 CSCL 03B

The mathematical relationship is analyzed between brightness temperatures expressed in two orthogonal polarizations of Martian thermal radiation, which were measured by the radiometer of the Mars 3 planetary probe, and properties of Martian soil. Dielectric constant epsilon and T containing the instrumentation parameters are utilized to evaluate the influence of particular errors on the relative error of the epsilon and T determination. The influence of the radiometer parameters, errors in determining the antenna orientation, and errors of the telemetering system on the total error in epsilon and T determination, are evaluated. The zones are calculated for optimum angles of radiometer antenna orientation with respect to the surface at which the minimum error is ensured. Calculations are made for the maximum possible error caused by depolarization of radiation received by the nearest side lobes of the antenna. Error in the determination of epsilon is reduced to 10-15%, with the existing instrumentation and the optimum choice of experimental conditions. Author

N75-13770*# Techtran Corp., Glen Burnie, Md.
MAN INVESTIGATES THE PLANETS
N. A. Varvarov Washington NASA Jun. 1974 179 p ref Transl. into ENGLISH from the book "Chelovek Issledyuyet Planety" Moscow, Mashinostroyeniye Press, 1973 192 p
(Contract NASw-2485)
(NASA-TT-F-15413) Avail: NTIS HC $7.00 CSCL 03B

Contemporary scientific concepts about the origin of the earth and the planets of our solar system are discussed along with the satellites of the planets, the minor planets, meteoric objectives, bolides, and meteorites. Why spacecraft are used to study the sun, its accompanying planets, and their satellites is explained. Data about the surface and atmosphere of Mars and Venus and the seasons, days, and climate of these planets are included. Data are given for the contemporary cosmodromes and space craft centers, spaceflight devices, and the chemical, nuclear, and electrical rocket motors. Selection of interplanetary trajectories and the peculiarities and conditions for flight to the near and distant celestial objects of our solar system both by automatic unmanned devices and by manned spaceships are discussed. Author

N75-13771*# Scientific Translation Service, Santa Barbara, Calif.
MARS-5: SURFACE AND ATMOSPHERE OF THE RED PLANET
L. V. Ksanfomaliti Washington NASA 23 Dec. 1974 14 p Transl. into ENGLISH from Zemlya i Vselennaya (USSR), no. 5, 1974 p 7-11
(Contract NASw-2483)
(NASA-TT-F-16080) Avail: NTIS HC $3.25 CSCL 03B

The operation of Mars 4 and 5, launched to Mars, is discussed. The scientific information is briefly described. It was found that the argon content in the Martian atmosphere is about 35%. Additional data indicate the surface rocks are highly pulverized. Author

N75-13772*# Kanner (Leo) Associates, Redwood City, Calif.
PHOTODISSOCIATION OF CO2 AND THE HEAT LIBERATION ASSOCIATED WITH IT IN THE UPPER ATMOSPHERES OF MARS AND VENUS
A. V. Dembovskiy, M. N. Iskov, and O. G. Lisin Washington NASA Jan. 1975 32 p refs Transl. into ENGLISH from Acad. of Sci. USSR (Moscow), Report Pr-165, 1974 p 1-38
(Contract NASw-2481)
(NASA-TT-F-16111; PR-165) Avail: NTIS HC $3.75 CSCL 03B

The photodissociation rate of CO2 in the atmospheres of Mars and Venus was calculated. Also calculated was the heat liberation and intensities of emissions associated with photodissociation. The total bulk photodissociation rate monotonely decreased with altitude throughout the thermosphere. The role of various photodissociation channels with excitation varies with altitude. Heat liberation due to photodissociation in the lower thermosphere (at altitudes below approximately 115 km in Mars and 140 km in Venus) is greater than due to photodissociation, and even though less in the upper thermosphere, still represents a considerable proportion of the latter. The effectiveness of heat liberation (fraction of energy of absorbed photons converted to heat) varies from 0.3 in the lower thermosphere to 0.2 at roughly 200 km in Mars and Venus and continues to decrease at greater altitudes. Author

N75-13773*# Kanner (Leo) Associates, Redwood City, Calif.
CERTAIN QUESTIONS OF THE DYNAMICS OF THE FORMATION OF THE GLASS PARTICLES OF THE REGOLITH
Yu. B. Chernyak and M. D. Nusinov Washington NASA Jan. 1975 24 p refs Transl. into ENGLISH from Acad. of Sci. USSR (Moscow), Report Pr-189, 1974 p 1-27
(Contract NASw-2481)
(NASA-TT-F-16109; Pr-189) Avail: NTIS HC $3.25 CSCL 03B

Diverse glass particles are present in large numbers in the lunar regolith, contribute to several of its specific physical characteristics, and thus are indicators of surface processes. Upon analysis, it was concluded that the condensational mechanism does not appreciably contribute to the formation of fine spherical regolith particles. The main cause of their formation was found to be the vibration and breakdown of liquid jets during the splashing of surface material as a consequence of meteoritic bombardment of the lunar surface. The size of the large particles is limited by some characteristic stability. Large spherical and elongated particles were formed during the splashing of liquid resulting from endogenic events (volcanism and so on) at significantly lower characteristic velocities. Author

N75-13774*# Stanford Research Inst., Menlo Park, Calif.
NEW METHODOLOGY FOR ASSESSING THE PROBABILITY OF CONTAMINATING MARS
D. Warner North, B. R. Judd, and J. P. Pezier 21 Jun. 1974 14 p refs Presented at the 17th COSPAR Meeting, Sao Paulo, Brazil, 21 Jun. 1974.
(Contract NASw-2535)
(NASA-CR-141109) Avail: NTIS HC $3.25 CSCL 03B

Methodology is proposed to assess the probability that the planet Mars will be contaminated by terrestrial microorganisms aboard a spacecraft. The present NASA methods are extended to permit utilization of detailed information on microbial characteristics, the lethality of release and transport mechanisms, and of other information about the Martian environment. Different types

of microbial release are distinguished, and for each release mechanism a probability of growth is computed. Using this new methodology, an assessment was carried out for the 1975 Viking landings on Mars. The resulting probability of contamination for each Viking lander is 6 x 10 to the -6 power, and is amenable to revision as additional information becomes available. Author

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N75-13775 Ohio State Univ., Columbus.
PHOTOELECTRIC SOLAR LIMB SCANS FOR DETERMINING MEAN CHROMOSPHERIC STRUCTURE Ph.D. Thesis
Philip Everett Barnhart 1974 213 p
Avail: Univ. Microfilms Order No. 74-24296

An observational technique was adapted to observe the intensity distribution across any limb of the sun simultaneously in two wave lengths. The selection of one wave length in the core of a strong chromospheric line and the other in a nearby portion of the continuum made it possible to obtain spacially coherent intensity profiles. The separation of the inflection points, or limbs of the two scans was found to be largely independent of the seeing. It is thus a reliable indicator of at least one average characteristic of the chromospheric structure -- the height above the photosphere at which the chromospheric material apparently becomes opaque. This height seems to show little latitude dependence for the Balmer lines, the H- and K-lines of Ca II and the Na D-lines, however, lines of He I show rather striking variations in intensity and extent above the limb at different latitudes. Dissert. Abstr.

N75-13776 Wyoming Univ., Laramie.
A DYNAMIC MODEL OF SOLAR CORONAL SPICULES Ph.D. Thesis
Surinder Kumar Sahai 1974 107 p
Avail: Univ. Microfilms Order No. 74-23703

The hydrodynamic equations for an ideal, inviscid hydrogen gas in a gravitational field were solved by an explicit Lax-Wendroff one-step technique using two-dimensional cylindrical coordinates assuming azimuthal symmetry. The height and the radius of the cylinder were taken to be 7800 km and 3800 km respectively. The base of the cylinder lay approximately 3800 km below the chromosphere-corona transition region. The temperature profile below the transistion region was taken from the radio data while the profile above it was calculated on the assumption of constant downward thermal flux. The calculations show that in the absence of magnetic field (vertical thermal conduction only) the atmosphere is stable. No radial motions are observed. Introduction of the magnetic field produces radial as well as vertical velocities. Spicule-like features are evident in a two-dimensional vector velocity pick. The density of such features is 2-3 times the density of the surroundings. Dissert. Abstr.

N75-13777# Johann-Wolfgang-Goethe-Universitat, Frankfurt am Main (West Germany).
ON THE ANOMALOUS BEHAVIOR OF SOME ODD-NUMBERED SUNSPOT CYCLES
Heinz Selic 1973 11 p refs In GERMAN; ENGLISH summary
(Rept-45) Avail: NTIS HC $3.25

Whereas Waldmeier's well-known displacement law is fulfilled by the 11-yr cycles generally with good approximation, some odd-numbered 11-yr cycles behave quite differently. An attempt is made to decide whether this irregularity arises from a too long duration of the period of rise or from a too great height of the maximum. The reasoning presented leads to the conclusion that the anomalous behavior of some odd-numbered 11-yr cycles is due more probably to an excess in the length of the period of rise than to an excess in the maximum height. Author

N75-13778# Lockheed Missiles and Space Co., Palo Alto, Calif.
ABRUPT DIMINUTION OF THE SOLAR LYMAN-ALPHA LINE FLUX IN THE 4, 7 AND 11 AUGUST 1972 FLARES
L. Martini, K. G. Bischoff, G. Pfau, B. Shtark, and Z. Ulrikh [1974] 4 p refs Transl. into ENGLISH from Kosmich. Issled., v. 12, no. 5, 1974 p 736-739
Avail: NTIS HC $3.25, National Translations Center, John Crerar Library, Chicago, Ill. 60616

Flux measurements in the Lyman-alpha line are presented. A strong diminution in the flux was observed. Author

N75-13779# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
MILLIMETER WAVE SOLAR OBSERVATIONS
John P. Castelli, Donald A. Guidice, and Paul M. Kalaghan 12 Jul. 1974 4 p refs
(AD-782710; AFCRL-TR-74-0308) Avail: NTIS CSCL 03/2

Several categories of millimeter wave observations in the range approximately 20 and 3 mm are considered. First, the general area of current observations conducted with small antennas of low resolving power and simple radiometric receivers is reviewed. The type of solar information derived and its application are discussed. The second area considered is that of current high-resolution solar investigations from antennas with beam widths as small as 1 minute of arc. Finally, future ultra-high resolution work (-10 arc seconds) by interferometer techniques and the need for such work are discussed. Author (GRA)

N75-13710* Scripta Publishing Corp., Washington, D.C.
MAGNETIC MEASUREMENTS IN MODEL EXPERIMENTS
E. M. Dubinin, G. G. Managadze, and I. M. Podgornyy *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 45-58 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 33-43 (For availability see N75-13707 04-90)
CSCL 03B

N75-13715* Scripta Publishing Corp., Washington, D.C.
THE INTERNAL STRUCTURE OF THE CONVECTIVE ENVELOPE OF THE SUN
I. M. Yavorskaya *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 124-150 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 89-108 (For availability see N75-13707 04-90)
CSCL 03B

N75-13717* Scripta Publishing Corp., Washington, D.C.
LOW-ENERGY PROTONS OF SOLAR ORIGIN AND INVESTIGATION OF THE INTERPLANETARY MEDIUM
V. N. Lutsenko and N. F. Pisarenko *In its* Interplanet. Medium and Phys. of the Magnetosphere (NASA-TT-F-784) Nov. 1974 p 175-202 refs Transl. into ENGLISH of the book "Mezhplanetnaya Sreda i Fizika Atmosfery" Moscow, Nauka Press, 1972 p 127-148 (For availability see N75-13707 04-90)
CSCL 03B

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N75-13780 Cornell Univ., Ithaca, N.Y.
A HIGH ENERGY GAMMA RAY SURVEY OF CYGNUS AND CASSIOPEIA Ph.D. Thesis
Murray Francis Campbell 1974 258 p
Avail: Univ. Microfilms Order No. 74-24270

A gamma-ray telescope was used to search for celestial sources at energies above several hundred MeV. Upper limits for the gamma ray emission of six strong X-ray sources are given. The atmospheric generation rate of secondary gamma rays was also determined. The gamma ray detector is a large balloon-borne gas Cherenkov detector which has been previously described. It has a sensitive area of 4.5 m2 and 20% efficiency. The instrument has an 8 deg field of view with angular resolution of about 1.5 deg. The observing program gave exposure to the

galactic plane from galactic longitude of 60 degrees to 120 degrees. An excess associated with the plane was observed, but of marginal statistical significance. An upper limit for photon energies above 400 MeV is set that is about a factor of five above an extrapolation of the OSO 3 average flux for the plane away from the galactic center. Dissert. Abstr.

N75-13781 Pittsburgh Univ., Pa.
RADIATION IN COSMOLOGICAL BACKGROUNDS Ph.D. Thesis
Sin-Chung Chang 1974 129 p
Avail: Univ. Microfilms Order No. 74-24175

Scalar and gravitational radiation in Friedmann backgrounds with positive, negative, and zero spatial curvature were studied. An attempt was also made to answer the question under what circumstances a wave propagates with or without a tail. Based on Newman-Penrose formalism, a basic wave equation for pure gravitational radiation in Friedmann background was derived. This wave equation coupled with a scalar wave equation serves as the basis of this study. After expanding the wave function in terms of spherical harmonics, a set of two-dimensional wave equations. A sufficient condition under which these wave equations represent propagation of waves without a tail is then given. A set of two-dimensional wave equations with closed form solutions was found. These equations, which represent characteristic propagation, could be used to test the validity of certain conjectures about the forms of wave equations which admit characteristic-propagation solutions. Dissert. Abstr.

N75-13782 Michigan Univ., Ann Arbor.
LATERAL DISTRIBUTION OF RADIO EMISSION FROM COSMIC RAY AIR SHOWERS Ph.D. Thesis
Richard Jay Castle 1974 152 p
Avail: Univ. Microfilms Orders No. 74-25169

Radio pulses from extensive air showers were detected by an experiment performed at the Bolivian air-shower joint experiment (BASJE) array located at an altitude of 5200 meters and geomagnetic latitude of 4 deg S on Mt. Chacaltaya in Bolivia. Five log-periodic antennas were used to detect the radio pulses. Four of these antennas were operated in a broad band mode (pre-detector bandwidth = 54 MHz), narrow band (3.5 MHz) mode; the narrow band channels, which were tapped off the broadband signal, were located at frequencies of 55 MHz, 83 MHz, and 175 MHz. Three hundred and thirteen showers out of 2340 had detectable radio pulses. Thirty events, arriving within the half power cone of the antennas and having a radio pulse in at least three antennas, were used to study the lateral distribution of radio pulses which was found not to be a simple monotonically decreasing function of distance from the shower axis. Dissert. Abstr.

N75-13783 Michigan Univ., Ann Arbor.
COSMIC RAY PROTON INTERACTIONS WITH ATMOSPHERIC NUCLEI AT 100 TO 800 GeV Ph.D. Thesis
Sheldon Robert Weiner 1974 149 p
Avail: Univ. Microfilms Order No. 74-25356

Properties of interactions of 100 to 800 GeV cosmic ray protons with atmospheric nuclei were deduced from relative frequencies of occurrence, estimated energies, and extent of air shower accompaniment of charged and neutral cosmic ray hadrons. The hadrons were observed by means of interactions they experienced in one of 17 iron plates of a multi-plate cloud chamber located at the site of the Bolivian Air Shower Joint Experiment (BASJE) on Mt. Chacaltaya in Bolivia. Energies were estimated from the size of cascades emerging from material situated between the cloud chamber and a set of scintillation detectors lying below. Extent of shower accompaniment was determined by an array of scintillation detectors surrounding the cloud chamber. Particular care was used in the analysis in defining and distinguishing between accompanied and unaccompanied hadrons. Dissert. Abstr.

N75-13784 Catholic Univ. of America, Washington, D.C.
CHARGE COMPOSITION OF SOLAR COSMIC RAYS IN THE 25 JANUARY 1971 SOLAR FLARE Ph.D. Thesis
Charles James Pellerin, Jr. 1974 141 p
Avail: Univ. Microfilms Order No. 74-19735

Varying energy intervals of solar cosmic rays are measured in the energy range from 11 to 35 MeV/nucleon. Abundances relative to oxygen are computed for the nuclei in the energy interval from 15 to 25 MeV/nucleon. The measurements were made in nuclear emulsion stacks which were carried above the atmosphere. A digital TV microscope system was utilized which operated on-line to two high-speed digital computers. The system measured particle track widths in nuclear emulsion as a function of residual range, enabling the charges of the nuclei to be determined. It is seen that at energies above about 10 MeV/nucleon, the enhancements of abundance ratios are limited to about a factor of three from flare to flare, in spite of large variations in other characteristics of these solar events. Solar particle acceleration models and the implications of the measurements presented are discussed. Dissert. Abstr.

N75-13785# Denver Univ., Colo.
THE 13TH INTERNATIONAL COSMIC RAY CONFERENCE. VOLUME 3: NM AND HE SESSIONS
1973 755 p refs Conf. held at Denver, 17-30 Aug. 1973; sponsored by NSF, NASA, NOAA, AEC, IUPAP, Martin Marietta Co., and TRW Systems Sponsored by AEC
(Conf-730804-P3-Vol-3) Avail: NTIS HC $17.25

Cosmic ray muons and neutrinos and ultrahigh energy interactions were treated in a series of papers submitted to the 13th International Cosmic Ray Conference. The papers are presented in their entirety and are each accompanied by an abstract. A.A.D.

N75-13786# Denver Univ., Colo.
THE 13TH INTERNATIONAL COSMIC RAY CONFERENCE. VOLUME 4: AS AND TI SESSIONS
1973 760 p Conference held in Denver, 17-30 Aug. 1973; sponsored by NSF, NASA, NOAA, AEC, IUPAP (UNESCO), Martin-Marietta Co., TRW Systems Inc. Sponsored by AEC
(CONF-730804-P4-Vol-4) Avail: NTIS HC $17.25

Extensive cosmic ray air showers and measurement techniques and instrumentation were treated in a series of papers submitted to the 13th International Cosmic Ray Conference. The papers are presented in their entirety and are each accompanied by an abstract. A.A.D.

N75-13787# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TECHNICAL DETAILS OF THE POLISH EXPERIMENT WITH THE GEOPHYSICAL ROCKET VERTIKAL-1 AND VERTIKAL-2
Marek Hlond 27 Aug. 1974 9 p Transl. into ENGLISH from Pomiary, Automat. Kontr. (Warsaw), v. 19, no. 5, May 1973 p 205-206
(AD-785999; FTD-HC-23-2734-74) Avail: NTIS CSCL 03/2

Certain technical details are discussed of the first Polish space experiment conducted from on board the Soviet geophysical rockets VERTIKAL-1 and VERTIKAL-2. A block diagram is given of the scientific equipment for the investigation of the sun's X-ray and ultraviolet radiation installed on the rocket. GRA

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N75-13788# Collins Radio Co., Cedar Rapids, Iowa.
RIVER AND HARBOR AID TO NAVIGATION SYSTEM (RIHANS) PHASE I-C; SYSTEM DEFINITION. VOLUME 4: COST Final Report, Jul. 1972 - Apr. 1973
E. Frye, R. McLaughlin, J. Dedich, W. Laubengayer, and G. Sellers
Nov. 1973 130 p refs
(Contract DOT-CG-21411-A)
(AD-780986/6; Rept-523-0765206-00181M-Vol-4) Avail: NTIS HC $5.75 CSCL 17/7

The report submits pricing for the service and user segments of the RIHANS program. The pricing satisfies the Phase I requirements of the RIHANS program and the guidelines established by the US Coast Guard. It is the intent to illustrate as much cost visibility as possible to enable mutual in-depth evaluation of the costs. Initial cost estimating was performed by the RIHANS Program Engineering Staff. The estimating was

accomplished primarily on a quantity one basis. Careful review was given to this estimate, as it was the basis for manufacturing estimates in the higher quantities involved. The end product has manufacturing build rates and variances applied. These equipments are quoted in terms of average manhours and rates. GRA

N75-13789# Naval Postgraduate School, Monterey, Calif.
EFFECTS OF SHORT PERIOD ANGLE OF ATTACK OSCILLATION TO AIR-TO-GROUND WEAPONS DIVE DELIVERY ACCURACY M.S. Thesis
David Pierre Gauthier Jun. 1974 101 p refs
(AD-782307) Avail: NTIS CSCL 19/5

A theoretical investigation of the effects of short period angle of attack oscillation on air-to-ground weapons dive delivery accuracy was conducted. The investigation included the computer modeling of the longitudinal control system of the F-4 aircraft. This longitudinal control system was used to fly the aircraft through its standard conventional dive bomb delivery maneuver, making corrections for various dive angle errors, detected four thousand feet above release altitude. (Modified author abstract) GRA

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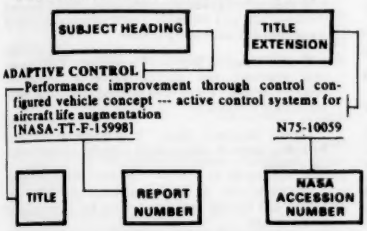

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BIBLIOGRAPHIES
Aeronautical Engineering: A special bibliography with indexes, supplement 46, July 1974
[NASA-SP-7037[46]] N75-12892
Phenomenology of LNG accidents: A selected bibliography
[P-5295] N75-13377
The gasification of coal: A bibliography
[PB-234294/7] N75-13400
Bibliography: Sandia Laboratory hybrid microcircuit and related thin film technology
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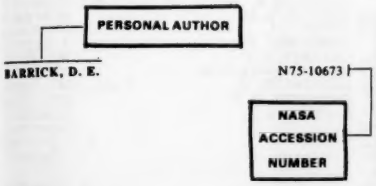

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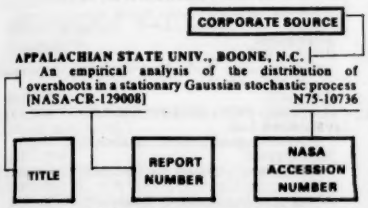

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ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT, PARIS [FRANCE].
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AEL SERVICE CORP., FARMINGDALE, N.J.
Test report: Radiofrequency interference/electromagnetic interference measurements New York air route traffic control center
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Integrated lift/drag controller for aircraft
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AERONAUTICAL RESEARCH LABS., MELBOURNE [AUSTRALIA].
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AMERICAN UNIV., WASHINGTON, D.C.
Utilization of ERTS-1 imagery in cultivation and settlement site identification and carrying capacity estimates in Upper Volta and Niger
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AMERIND PUBLISHING CO. PVT. LTD., NEW DELHI [INDIA].
Lectures on crystal morphology
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AMPEX CORP., REDWOOD CITY, CALIF.
Method for making conductors for ferrite memory arrays
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APPLIED PHYSICS LAB., JOHNS HOPKINS UNIV., SILVER SPRING, MD.
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Airport vicinity air pollution study
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Proceedings of the Symposium on Advanced Technology Arising from Particle Physics Research
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ARMY AIR MOBILITY RESEARCH AND DEVELOPMENT LAB., FORT EUSTIS, VA.
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ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, N.H.
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ARMY MATERIAL COMMAND, TEXARKANA, TEX.
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MEGASTAR: The meaning of growth. An assessment of systems, technologies, and requirements
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AUTONETICS, ANAHEIM, CALIF.
Concept for a satellite-based advanced air traffic management system. Volume 3: Operational logic flow diagrams for a generic advanced air traffic management system
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An international operators view on MLS
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Retorting indexes for oil-shale pyrolyses from ethylene-ethane ratios of product gases
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The hard start phenomena in hypergolic engines. Volume 3: Physical and combustion characteristics of engine residuals
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The hard start phenomena in hypergolic engines. Volume 4: The chemistry of hydrazine fuels and nitrogen tetroxide propellant systems
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The hard start phenomena in hypergolic engines. Volume 5: RCS engine deformation and destruct tests
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Flow problems in astrophysical systems
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Vibrational energy transfer processes in gaseous mixtures investigated by the laser induced vibrational fluorescence technique
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Charge composition of solar cosmic rays in the 25 January 1971 solar flare
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CENTER FOR CALIFORNIA PUBLIC AFFAIRS, CLAREMONT.
Environmental impact requirements in the states: NEPA's offspring
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Auger electron spectroscopy at BNL
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Improved displays for ultrasonic testing
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Identification and adaptive control of an industrial polymerization process
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CIVIL AEROMEDICAL INST., OKLAHOMA CITY, OKLA.
Characteristics of medically disqualified airman applicants during calendar year 1971
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Amplitude/frequency differences in a supine resting single lead electrocardiogram of normal versus coronary heart diseased males
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Properties of long-wavelength dispersion relations of ionic crystals
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River and harbor aid to navigation system [RIHANS] phase 1-C; system definition. Volume 4: Cost
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COLORADO SCHOOL OF MINES, GOLDEN.
Liquid lithium corrosion research
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Theory of pulsars: Polar gaps, sparks, and coherent microwave radiation
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COMMISSARIAT A L'ENERGIE ATOMIQUE, BRUYERES-LE-CHATEL [FRANCE].
Study of phase transformations in titanium alloys. 2: Contribution to the study of isothermal transformations in Ti-6% Al-6% V-2% Sn-titanium alloy, after quenching from alpha + beta
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Energy storable in superconducting resonant cavities
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Storage and utilization of liquid hydrogen on board the Pegase
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Study of fluorine in the condensed and adsorbed states using spectroscopic methods
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Analysis and synthesis of a logic control circuit by binary analysis methods
[CEA-R-4588] N75-13556
COMMITTEE ON AERONAUTICAL AND SPACE SCIENCES [U. S. SENATE].
Earth resources satellites
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COMMITTEE ON APPROPRIATIONS [U. S. SENATE].
Department of Defense appropriations for fiscal year 1975. Part 1: Department of Defense, defense agencies, public witnesses
[GPO-32-382] N75-13680
Department of Defense appropriations for fiscal year 1975. Part 3: Department of the Navy
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COMMITTEE ON SCIENCE AND ASTRONAUTICS [U. S. HOUSE].
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An initial concept for the FAA integrated communications system
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CONTROL DATA CORP., MINNEAPOLIS, MINN.
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Effects of oxidant levels on selected health characteristics of persons in the Los Angeles Basin. Volume 1: Data collection
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A numerical investigation of stably stratified, wind driven cavity flow by the finite element method
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Some questions of glacio-isostasy
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The 13th International Cosmic Ray Conference. Volume 3: NM and HE sessions
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The 13th International Cosmic Ray Conference. Volume 4: AS and TI sessions
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DEPARTMENT OF CIVIL AVIATION, MELBOURNE [AUSTRALIA].
INTERSCAN: A new non-visual precision approach and landing guidance system for international civil aviation
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Water survey of Canada: Application for use of ERTS-A for retransmission of water resources data
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Water survey of Canada: Application for use of ERTS-A for retransmission of water resources data
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DRAPER [CHARLES STARK] LAB., INC., CAMBRIDGE, MASS.
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DREXEL UNIV., PHILADELPHIA, PA.
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Preparation and evaluation of medical-grade plutonium-238 fuels, 1 July 1971 - 30 June 1973
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Capacitance discharge system for ignition of Single Bridge Apollo Standard Initiators [SBASI]
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LTV AEROSPACE CORP., HAMPTON, VA.
Theoretical nitric oxide production incidental to autoignition and combustion of several fuels homogeneously dispersed in air under some typical hypersonic flight conditions
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MAGNAVOX RESEARCH LABS., TORRANCE, CALIF.
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Titan 3E/Centaur D-1T systems summary
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Turnstile and flared cone UHF antenna
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[NASA-CR-140373] N75-13198
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[AD-778951] N75-13522
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MECHANICAL TECHNOLOGY, INC., LATHAM, N.Y.
Effects of vibration and shock on the performance of gas-bearing space-power Brayton cycle turbomachinery. Part 4: Suppression of rotor-bearing system vibrations through flexible bearing support damping
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META SYSTEMS, INC., SANTA CLARA, CALIF.
Remote entry of progress reports in an automated oceanic air traffic control system
[AD-779537] N75-12927
MICHIGAN UNIV., ANN ARBOR.
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Cosmic ray proton interactions with atmospheric nuclei at 100 to 800 GeV
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MILITAERPSYKOLOGISKA INSTITUTET, STOCKHOLM [SWEDEN].
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MINISTRY OF TRANSPORT, OTTAWA [ONTARIO].
STOL demonstration program: Canada
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MISSISSIPPI STATE UNIV., STATE COLLEGE.
Comparison of AM and FM modulation techniques with Walsh equivalents
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Enhancing the testability of synchronous sequential machines with emphasis on large scale integrated circuits
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MITRE CORP., BEDFORD, MASS.
Concept of operation for handling I/O in a secure computer at the Air Force Data Services Center [AFDSC]
[AD-780529/4] N75-13542
Remote-terminal emulator [design verification model]: Support software and hardware diagnostics, volume 9
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MITRE CORP., MCLEAN, VA.
An advanced air traffic management concept based on extensions of the upgraded third generation ATC system. System B: General requirements specification
[AD-785264] N75-12929

MONSANTO RESEARCH CORP., DAYTON, OHIO.
Effect of gas turbine efficiency and fuel cost on cost of producing electric power
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MONTANA STATE UNIV., BOZEMAN.
High-temperature oxidation of iridium
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Atmospheric water resources management program. Bridger range cloud seeding experiment
[PB-234012/3] N75-13465
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[AD-785272] N75-13548

MONTANA STATE UNIV., MISSOULA.
Junction analysis and temperature effects in semiconductor heterojunctions
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MOTOREN- UND TURBINEN-UNION MUENCHEN G.M.B.H. [WEST GERMANY].
Prediction techniques
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MOUND LAB., MIAMISBURG, OHIO.
Pulsed arc welding copper to copper
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Mechanical handling and precision positioning of ultrafine gold wire
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Mound Laboratory isotopic power fuels programs, January - June 1974
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N

NAGOYA UNIV. [JAPAN].
Some aspects on Tokamaks with noncircular cross section
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Coupled electron-plasma and ion acoustic solitons excited by parametric instability
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NATIONAL ACADEMY OF ENGINEERING, WASHINGTON, D.C.
Evaluation of coal-gasification technology. Part 1: Pipeline-W quality gas
[PB-234036/2] N75-13396

NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA [ONTARIO].
Flight loads on large aircraft engaged in 1974 budworm spraying program
[LTR-ST-733] N75-12936

NATIONAL AERONAUTICAL LAB., BANGALORE [INDIA].
Numerical solutions of the compressible, laminar boundary layers with pressure gradients at large Prandtl numbers
[NAL-TN-29] N75-13192

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Measurements of the vortex wakes of a subsonic and supersonic transport model in the 40 by 80 foot wind tunnel
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[NASA-TM-X-62401] N75-13105
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[NASA-TN-D-7818] N75-13314
BESMEX: Bering Sea marine mammal experiment
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Water purification process
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Transportation vehicle energy intensities. A joint DOT/NASA reference paper
[NASA-TM-X-62404] N75-13690
A primer in lunar geology
[NASA-TM-X-62359] N75-13730
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Summary of scientific results: Apollo 11
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. FLIGHT RESEARCH CENTER, EDWARDS, CALIF.
Aerodynamic drag reduction tests on a full-scale tractor-trailer combination with several add-on devices
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Test techniques, instrumentation, and data processing
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
Summary of spacecraft technology, systems reliability, and tracking data acquisition
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FLA.
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Helicopter rotor rotational noise predictions based on measured high-frequency blade loads
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
Interim prediction method for low frequency core engine noise
[NASA-TM-X-71627] N75-12950

Influence of mixer nozzle velocity decay characteristics on CTOL-OTW jet noise shielding
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An experimental study of the effect of treated length on fan inlet noise suppressors
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Effect of anode ring arrangement on the spectroscopic characteristics of the NASA Lewis bumpy torus plasma
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Ion heating and containment in the NASA Lewis bumpy torus plasma
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.

Fine frequency measurement by coincidence detection
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Fluid mass sensor
[NASA-CASE-MSC-14653-1] N75-13218
The ERTS-1 investigation. Volume 7: Erts-1 land-use analysis of the Houston area test site
[E75-10009] N75-13334
The ERTS-1 investigation [ER-600]. Volume 2: ERTS-1 coastal/estuarine analysis
[NASA-TM-X-58118] N75-13371
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Automatic biowaste sampling
[NASA-CASE-MSC-14640-1] N75-13536
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.

Automatically operable self-leveling load table
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[NASA-TR-R-431] N75-13372
Downwind hazard calculations for space shuttle launches at Kennedy Space Center and Vandenberg Air Force Base
[NASA-TM-X-3162] N75-13406
Self-energized plasma compressor
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MISSISSIPPI TEST FACILITY, BAY SAINT LOUIS.

Evaluation of satellite remote sensing and automatic data techniques for characterization of wetlands and coastal marshlands
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Evaluation of satellite remote sensing and automatic data techniques for characterization of wetlands and coastal marshlands
[E75-10028] N75-13344

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.

Fiber distributed feedback laser
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[NASA-CASE-NPO-13281-1] N75-13266
Real time analysis of voiced sounds
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.

Aeronautical Engineering: A special bibliography with indexes, supplement 46, July 1974
[NASA-SP-7037[46]] N75-12892
Electronic test instrumentation and techniques: A compilation
[NASA-SP-5907[03]] N75-13219
Electrical hand tools and techniques: A compilation
[NASA-SP-5916[03]] N75-13267
ERTS-B [Earth Resources Technology Satellite]
[NASA-NEWS-RELEASE-74-329] N75-13370
Testing methods and techniques: A compilation
[NASA-SP-5931[02]] N75-13586
NASA publications manual 1974
[NASA-SP-7013] N75-13676
NASA patent abstracts bibliography: A continuing bibliography. Section 1: Abstracts
[NASA-SP-7039[05]] N75-13677
NASA patent abstracts bibliography: A continuing bibliography. Section 2: Indexes
[NASA-SP-7039[05]] N75-13678
The new Mars: The discoveries of Mariner 9
[NASA-SP-337] N75-13729

NATIONAL AEROSPACE LAB., TOKYO [JAPAN].

On the reduction of unsteady thermal stress in air cooled turbine blades
[NAL-TR-364] N75-12963
Flexural fatigue strength of carbon fiber composites
[NAL-TR-366] N75-13037
Computer analysis of linear electric circuit with a storage tube graphical display and Rand tablet device
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NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER, ATLANTIC CITY, N.J.

The 1973 Los Angeles Air Route Traffic Control Center's air traffic model
[AD-781387] N75-12923
Survey of national airspace system en route related support and data reduction and analysis programs
[AD-779495] N75-12926
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[AD-785016] N75-12975
Reduction of voltage standing wave ratio on Doppler very high frequency omnirange
[AD-777624] N75-12978
Test report: Radiofrequency interference/electromagnetic interference measurements New York air route traffic control center
[AD-784340] N75-13131

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.

Semiconductor measurement technology: ARPA/NBS Workshop 2. Hermeticity testing for integrated circuits
[NBS-SP-400-9] N75-13285

NATIONAL ENVIRONMENTAL SATELLITE SERVICE, WASHINGTON, D.C.

The Operation of the NOAA polar satellite system
[NOAA-TM-NESS-60] N75-13429
Compatibility of low-cloud vectors and rawins for synoptic scale analysis
[NOAA-TR-NESS-70] N75-13488
Application of meteorological satellite data in analysis and forecasting
[AD-786137] N75-13494

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.

Remote sensing wind and wind shear system
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NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C.

An analysis of federal R and D funding by function, fiscal years 1969 - 1975
[NSF-74-313] N75-13682

NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D.C.

Aircraft accident report. Trans World Airlines, Inc., Boeing 707-331B, N8705T, Los Angeles, California, 28 August 1973
[PB-234422/4] N75-12915
Aircraft accident report: National airlines, incorporated, McDonnell-Douglas DC-10-10, N60NA, near Tampa, Florida, 8 July 1974
[PB-234791/2] N75-12916

NAUKA PRESS, MOSCOW [USSR].

Fundamentals of the theory of the radio reception of discrete signals N75-13119
Band transmission lines N75-13583

NAUKA PRESS, NOVOSIBIRSK [USSR].

Certain problems of the theory of the Monte-Carlo methods N75-13579

NAVAL ACADEMY, ANNAPOLIS, MD.

Impact strength of fibrous composite materials for high performance structures
[AD-786143] N75-13040

NAVAL INTELLIGENCE SUPPORT CENTER, WASHINGTON, D.C.

Research on traveling wave amplifiers and two frequency and commercial gas lasers
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NAVAL ORDNANCE LAB., WHITE OAK, MD.

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NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.

Introduction to distortion induced engine instability N75-12955
Effects of short period angle of attack oscillation to air-to-ground weapons dive delivery accuracy
[AD-782307] N75-13789

NAVAL RESEARCH LAB., WASHINGTON, D.C.

Sampling and determining the concentration of film-forming organic constituents of the air-water interface
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Solitary occupancy for unequal cell probabilities with application to Doppler radars for ocean surveillance
[AD-780692/0] N75-13135
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A second order Runge-Kutta integration subroutine that uses a different step-size for each variable
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Filter and film method of measuring the temperature of a hot, dense, low-Z plasma from its quantum bremsstrahlung
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NEBRASKA UNIV., LINCOLN.

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Use of ERTS-1 imagery to interpret wind-erosion hazard in the Sandhills of Nebraska
[E75-10044] N75-13347

NEW MEXICO STATE UNIV., UNIVERSITY PARK.

Determination of air temperature in the upper atmosphere with multiple sensor thermometry N75-13421

NEW MEXICO UNIV., ALBUQUERQUE.

Identification, distribution and significance of lunar volcanic domes
[CONTRIB-33] N75-13746

NEW SOUTH WALES UNIV., SYDNEY [AUSTRALIA].

Approach to physical sciences, 1974 N75-13584

NEWCASTLE-UPON-TYNE UNIV. [ENGLAND].

Dynamic fracture toughness measurement
[AD-784670] N75-13326

NORTH CAROLINA STATE UNIV., RALEIGH.

Aspects of theoretical plasticity at finite deformation and large pressure
[PB-234329/1] N75-13076
Utilization of EREP data in geological evaluation regional planning, forest management, and water management in North Carolina
[E75-10063] N75-13363
An ecological systems approach to community noise abatement, phase 1
[PB-234311/9] N75-13415

NORTH CAROLINA UNIV., CHAPEL HILL.

Aspects of extreme value theory for stationary processes: A survey
[AD-785278] N75-13570

NORTHEASTERN UNIV., BOSTON, MASS.

Bulk strip production of an amorphous Cu-Zr alloy by plasma arc spraying
[AD-785910] N75-13115

NORTHERN PRAIRIE WILDLIFE RESEARCH CENTER, JAMESTOWN, N. DAK.

Utilization of Skylab [EREP] system for appraising changes in continental migratory bird habitat
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NORTHROP CORP., HAWTHORNE, CALIF.

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POLISH ACADEMY OF SCIENCES, WARSAW.
Theory of the creation of vacant microfissures in deformation of metals
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Asymptotic expression for a field in an open wave with an activated linear source
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Bibliography: Sandia Laboratory hybrid microcircuit and related thin film technology
[SAND-74-0009] N75-13669
Balancing reliability, cost, and hardness
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Quantitative characterization of the environment experienced by cargo in motor carrier accidents
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SCIENCE RESEARCH COUNCIL, CHILTON [ENGLAND].
Design study for beam line dipoles [superconducting]
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SCIENTIFIC TRANSLATION SERVICE, ANN ARBOR, MICH.
Atomic collisions on the surface of a solid body
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SCIENTIFIC TRANSLATION SERVICE, SANTA BARBARA, CALIF.
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SCOTT AVIATION CORP., LANCASTER, N.Y.
Self-contained breathing apparatus
[NASA-CASE-MSC-14733-1] N75-13534

SCRIPTA PUBLISHING CORP., WASHINGTON, D.C.
Interplanetary medium and physics of the magnetosphere
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SERVICE TECHNIQUE DE LA NAVIGATION AERIENNE, PARIS [FRANCE].
Presentation of a different MLS concept
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SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASS.
An evaluation of SAO sites for laser operations
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Mapping of the major structures of the African rift system
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SOCIETE NATIONALE D'ETUDE ET DE CONSTRUCTION DE MOTEURS D'AVIATION, VILLAROCHE [FRANCE].
Sources of distortion and compatibility
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SOLA BASIC INDUSTRIES, GOLDSBORO, N.C.
Approach Light System [ALS]. Multiple distribution system redesign
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SOUTHERN METHODIST UNIV., DALLAS, TEX.
Growth of gallium nitride crystals
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Many-particle theory of nuclear systems with application to neutron star matter
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STANDARD ELECTRIK LORENZ A.G., STUTTGART [WEST GERMANY].
System presentation [status]
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STANFORD RESEARCH INST., MENLO PARK, CALIF.
Analysis techniques for incoherent-scatter data interpretation in the 100-300 km region
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STEVENS INST. OF TECH., HOBOKEN, N.J.
Aeromechanical Response
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STICHTING NATIONAAL LUCHT- EN RUIMTEVAARTLABORATORIUM, DELFT [NETHERLANDS].
Report for the year 1973
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SUOMALAINEN TIEDEAKATEMIA, HELSINKI [FINLAND].
Ionospheric meeting
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SUOMALAINEN TIEDEAKATEMIA, SODANKYLAE [FINLAND].
Examples of ionogram sequences from Sodankyla
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SUSSEX UNIV., BRIGHTON [ENGLAND].
Experiments on the formation and surface states of adsorbed helium films
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SYRACUSE UNIV., N.Y.
Characteristics and capabilities of Walsh functions
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Investigation into the formation of wing-tip vortices
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Stability, behaviour and vibrations of an annular plate under uniform compression
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TEL-AVIV UNIV. [ISRAEL].
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TELEDYNE ISOTOPES, TIMONIUM, MD.
Economic radioisotope thermoelectric generator program: Program plan
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TENNESSEE UNIV., KNOXVILLE.
Investigation of the utility of kinetically controlled and catalytic reactions to perform environmental determinations by parallel spectrophotometric analysis
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TENNESSEE UNIV. SPACE INST., TULLAHOMA.
Numerical solution for unsteady sonic flow over thin wings
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TEXAS INSTRUMENTS, INC., DALLAS.
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TEXAS TECHNOLOGICAL UNIV., LUBBOCK.
Applications of group theory to pattern recognition
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TEXAS UNIV., AUSTIN.
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A radio frequency assisted magnetic mirror
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Ninety degree ruby laser light scattering from a deuterium dense plasma focus device
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TOKYO UNIV. OF EDUCATION [JAPAN].
Scaling and duality scheme in deep inelastic processes
[TUETP-74-12] N75-13598
Dynamic behavior of turbulent heating of plasmas
[IPPJ-198] N75-13633

TORONTO UNIV. [ONTARIO].
Test results on initial value methods for non-stiff ordinary differential equations
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A review of the status of MHD power generation technology including suggestions for a Canadian MHD research program
[UTIAS-39] N75-13641

TOULOUSE UNIV. [FRANCE].
Contribution of the study of thyristors: Direct block regime, trigger closing
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TRANSPORTATION RESEARCH BOARD, WASHINGTON, D.C.
Cost-benefit and other economical analyses of transportation
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TRW SYSTEMS GROUP, REDONDO BEACH, CALIF.
Final design of an AT-grade guideway for the tracked air cushion research vehicle
[PB-234814/2] N75-12908
Space shuttle sortie payload crew safety and systems compatibility criteria. Volume 1: Executive summary
[NASA-CR-128952] N75-13016
Space shuttle sortie payload crew safety and systems compatibility criteria. Volume 2: Crew safety design and verification criteria
[NASA-CR-128956] N75-13017
Space shuttle sortie payload crew safety and systems compatibility criteria. Volume 3: Systems compatibility design and verification criteria
[NASA-CR-128957] N75-13018

TSUKUBA UNIV. [JAPAN].
Further remarks on the local-scale-invariant theory of gravitation
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U

ULTRASYSTEMS, INC., IRVINE, CALIF.
Kinetic mechanism of methane/air combustion with pollutant formation
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UNITED AIRCRAFT CORP., EAST HARTFORD, CONN.
High power dye lasers
[AD-786232] N75-13256

UNITED AIRCRAFT CORP., STRATFORD, CONN.
The 3000-HP roller gear transmission development program. Volume 4: Laboratory bench test
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UNITED KINGDOM ATOMIC ENERGY AUTHORITY, CULHAM [ENGLAND].
General purpose continuous observation infra-red viewer
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UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL [ENGLAND].
Formation of cavities in steels exposed to liquid sodium
[AERE-R-7734] N75-13099

UNITED KINGDOM ATOMIC ENERGY AUTHORITY, RISLEY [ENGLAND].
Conform: A new concept for the continuous extrusion forming of metals
[TRG-REPT-2530] N75-13113
Simple triangular membrane finite element
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UNIVERSITE SCIENTIFIQUE ET MEDICALE DE GRENOBLE [FRANCE].
Contribution of the study of charge wakes in electricity
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UNIVERSITY OF SOUTHERN CALIF., LOS ANGELES.
Light scattering studies in ferroelectric crystals
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Analysis of phase-locked loop in the presence of time varying communication channels
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Temperature dependence of the phonons in BaTiO3 and some effects of the exciton on the raman scattering of Cu2O and CdS
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UTAH UNIV., SALT LAKE CITY.
Digital image deblurring by nonlinear homomorphic filtering
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VANDERBILT UNIV., NASHVILLE, TENN.
Negatively buoyant jets in a cross flow
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VIRGINIA INST. OF MARINE SCIENCE, GLOUCESTER POINT.
Investigation of surface films: Chesapeake Bay entrance
[PB-232968/8] N75-13501

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG.
Three dimensional finite element analysis of thick laminated composites: Including interlaminar and boundary effects near circular holes
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VIRGINIA UNIV., CHARLOTTESVILLE.
High frequency noise in Schottky barrier diodes
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Coupled thermoelastic vibrations of thin shells of revolution
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WAHLER [W.A.] AND ASSOCIATES, PALO ALTO, CALIF.
Emergency investigation of coal mine refuse embankments
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WASHINGTON UNIV., SEATTLE.
Columbia River effects in the Northeast Pacific: Physical oceanography
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WASHINGTON UNIV., ST. LOUIS, MO.
Telecommunications media for the delivery of educational programming
[NASA-CR-140880] N75-13674

WATERVLIET ARSENAL, N.Y.
Effect of surface profiles on characteristics of concentric recoil bearings
[AD-780056/8] N75-13283

WELDING INST., CAMBRIDGE [ENGLAND].
The metallurgy and welding of QT 35 and HY 80 steels
N75-13078

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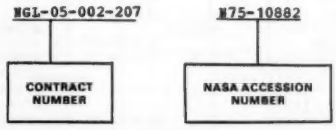

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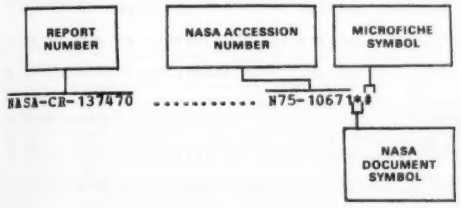

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US-PATENT-CLASS-338-162 ..... N75-13265*
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US-PATENT-3,851,250 ..... N75-13007*
US-PATENT-3,853,003 ..... N75-12969*
US-PATENT-3,853,075 ..... N75-12968*
US-PATENT-3,854,097 ..... N75-13625*+
US-PATENT-3,854,113 ..... N75-13265*
US-PATENT-3,855,873 ..... N75-13266*

USAAMRDL-TR-73-98D ..... N75-12907 #
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USAMC-ITC-02-08-73-015 ..... N75-13166 #

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UTIAS-39 ..... N75-13641 #

W-74-10527 ..... N75-13417 #

WANL-M-FR-74-002 ..... N75-13086*#

WASH-1295 ..... N75-13644 #
WASH-1300 ..... N75-13490 #

WVT-TR-74013 ..... N75-13283 #

W74-08831 ..... N75-13501 #
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W74-10543 ..... N75-13414 #

Y-1946 ..... N75-13668 #

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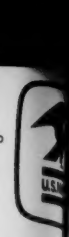
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